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COMMERCIAL FISHERIES REVIEW

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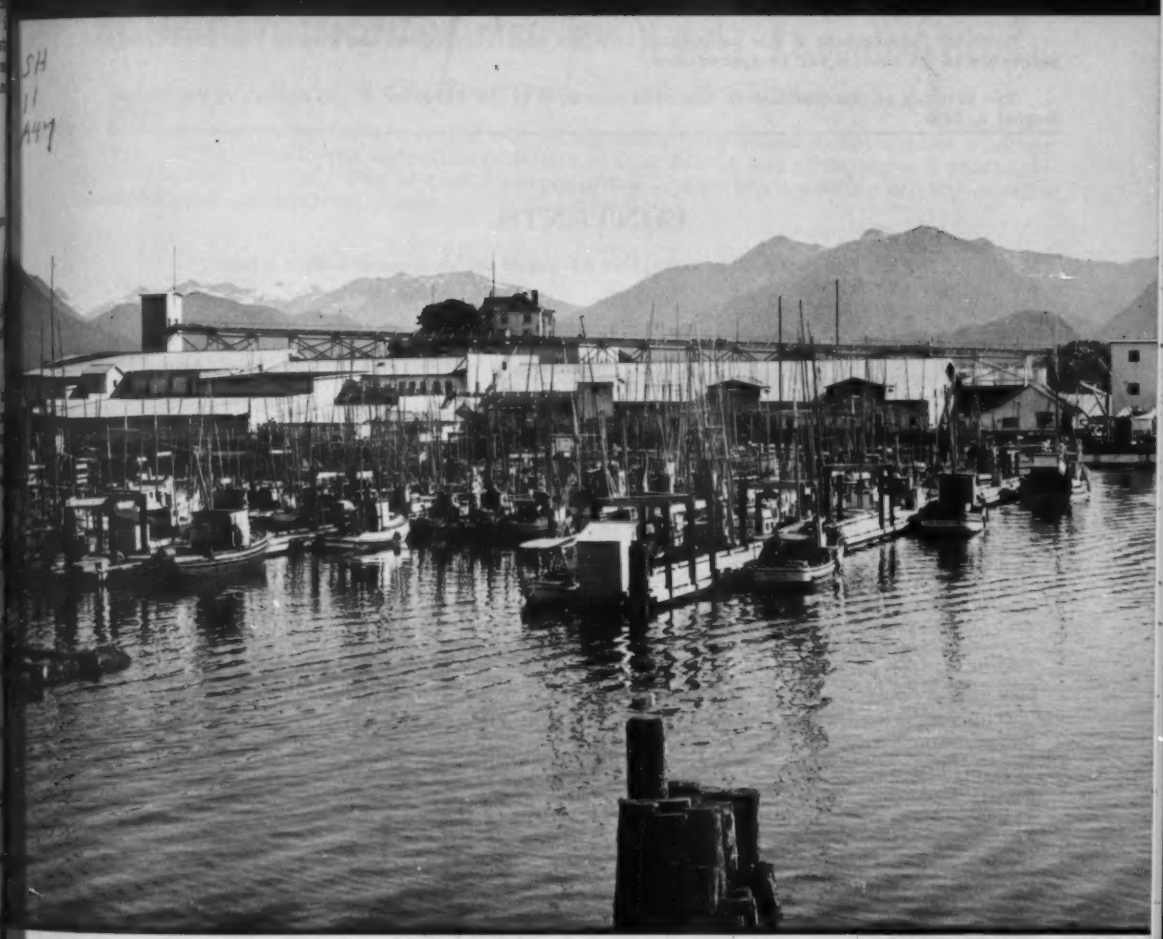

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JOHN L. FARLEY, DIRECTOR

COMMERCIAL FISHERIES REVIEW

A review of developments and news of the fishery industries
prepared in the BRANCH OF COMMERCIAL FISHERIES

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COMMERCIAL FISHERIES REVIEW

November 1955 Washington 25, D.C. Vol. 17, No. 11

BONE DETECTION IN FISH BY X-RAY EXAMINATION

By Anthony J. Frascatore, Jr. and J. A. Holston*

This research has been carried out on a preliminary scale to determine whether X-rays can be used in the detection of bones in fish fillets and of bones and voids (air spaces) in fish blocks. The ultimate purpose was to develop a routine quality-control measure on a commercial scale.

EXPERIMENTAL PROCEDURES

Nine test samples were prepared in the following manner:

SAMPLE 1 - FROZEN FILLET BLOCK: Seven and one-half pounds of boneless haddock fillets were placed in a galvanized steel pan and frozen in a plate freezer producing a frozen block 9 by $11\frac{3}{8}$ by $1\frac{13}{16}$ inches. Varying thicknesses were produced on the block by cutting it in staircase fashion by means of a band saw (fig. 1). Fifteen steps were made in the block, each $\frac{1}{8}$ of an inch high and $\frac{1}{2}$-inch deep for the full width of the block. Bones were inserted into the side of the block in the middle of each step so that they were about $\frac{1}{2}$-inch apart and at varying depths of $\frac{1}{8}$ of an inch. Bones from two species of fish were used: from smelt (those lining the visceral cavity) and from haddock (those from the backbone in the tail region of the fish). The bones were inserted through the sides of the semithawed block by means of a wire probe. There was one bone for every $\frac{1}{8}$ of an inch in depth, or one bone on the first step, two on the second step, etc. (fig. 1). An attempt was made to space the bones in such a manner that they were not directly on top of one another when "viewed" from above the block. Actually this was not entirely possible, because of the difficulty in working with the semithawed fish block. The bones, therefore, were inserted at the indicated height but did not necessarily appear in the uniform arrangement shown in the diagram in figure 1. In order to avoid the difficulty, at the 11th to 15th steps some of the bones were inserted into the "face" of the block perpendicular to the edges of the steps. Sea smelt bones (0.35-0.45 mm. thick and averaging 12.7 mm. long) were used in the first five steps; haddock bones (0.70-0.90 mm. thick and averaging 12.7 mm. long) were used in the 6th to 15th steps.

SAMPLE 2 - HADDOCK SLABS: A second frozen boneless haddock block was prepared as described in sample 1. The frozen block was then cut into rectangular sections $2\frac{1}{2}$ by 3 by $\frac{1}{8}$ inches. These sections were used to build up fish slabs of varying thicknesses. Haddock bones (from the belly flap of scrod haddock) were inserted between each layer. The thickness of the bones was measured at their centers--the smaller thickness was recorded. The bone lengths were measured with a millimeter rule. The blocks were prepared with bones located at various points as illustrated (fig. 2). Each slab was about $\frac{1}{8}$ of an inch thick. Bones were placed between each slab where illustrated by small letters in figure 2.

SAMPLE 3 - HADDOCK SLABS: Trimmed-down portions of belly flaps taken from several sea smelt were cut into sections about $\frac{1}{2}$- to 1-inch square. These sections containing an array of bones were then inserted between rectangular slabs

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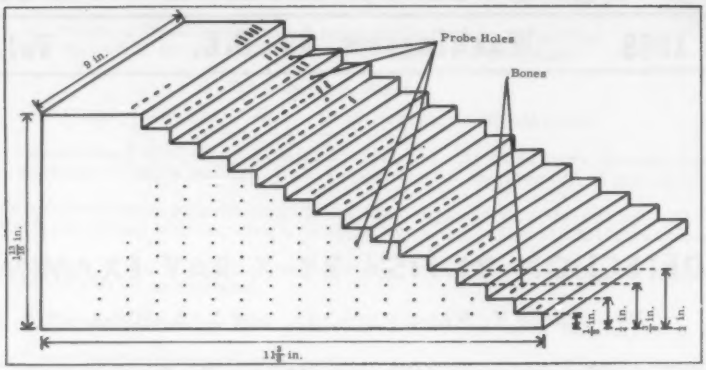


Fig. 1a - Three-dimensional view of fillet block cut in staircase fashion with 15 steps each $\frac{1}{8}$-inch high and $\frac{1}{8}$-inch deep for the full width of the block. Bones from smelt and haddock were inserted through the sides of the semi-thawed blocks by means of a wire probe--one bone was inserted for every $\frac{1}{8}$-inch of depth (one bone on the first or bottom step, two on the second step, etc.).

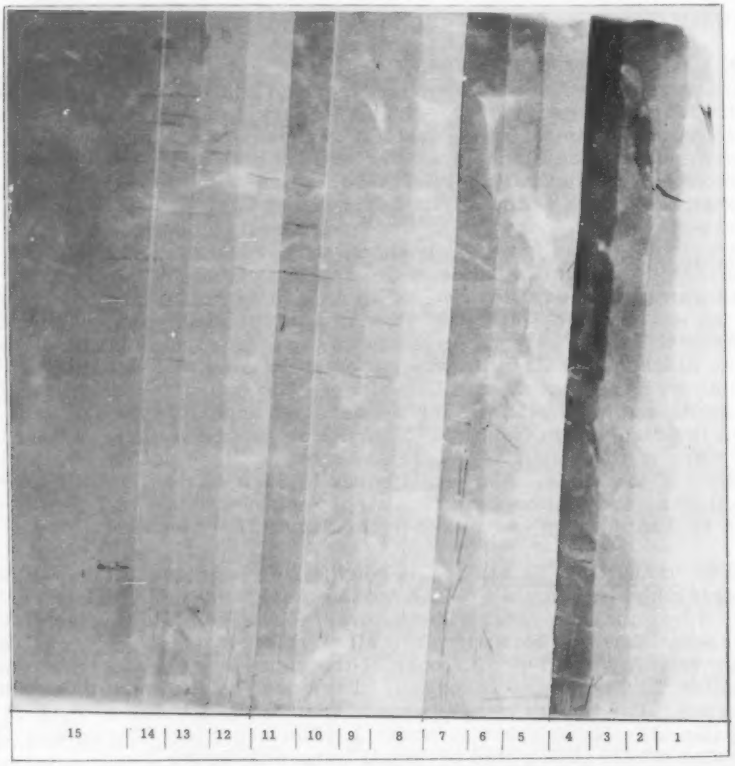
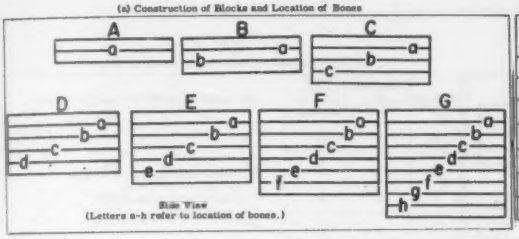


Fig. 1b - Radiograph of fillet block taken from the top view showing bones. Although the bones were inserted at indicated heights, the radiograph shows that they necessarily were not inserted in the uniform arrangement shown in the sketch above. Numbers show the steps as sketched above.

(a) Construction of Blocks and Location of Bones



(b) Dimensions of Blocks and Sizes of Bones

Sample	Number of Slabs	Total Thickness in Inches	Dimensions of Bones in Millimeters
A	2	$\frac{1}{4}$	a 39 - 0.54
B	3	$\frac{3}{8}$	a 44 x 0.69
			b 35 x 0.74
C	4	$\frac{1}{2}$	a 40 x 0.72
			b 136 x 0.56 c 134 x 0.70
D	5	$\frac{5}{8}$	a 38 x 0.57 c 38 x 0.61
			b 32 x 0.71 d 45 x 0.71
E	6	$\frac{3}{4}$	a 38 x 0.58 c 40 x 0.66
			b 41 x 0.68 d 31 x 0.68 e 43 x 0.62
F	7	$\frac{7}{8}$	a 30 x 0.72 c 35 x 0.63 e 39 x 0.71
			b 34 x 0.63 d 39 x 0.66 f 37 x 0.74
G	9	$1\frac{1}{8}$	a 36 x 0.72 c 28 x 0.65 e 33 x 0.66 g 31 x 0.75
			b 39 x 0.72 d 42 x 0.62 f 38 x 0.56 h 44 x 0.65

Fig. 2a - Fillet blocks were built up by using slabs $2\frac{1}{2}$ by 3 by $\frac{1}{8}$ inches. Block A consists of two such slabs, Block B of 3 slabs, etc.

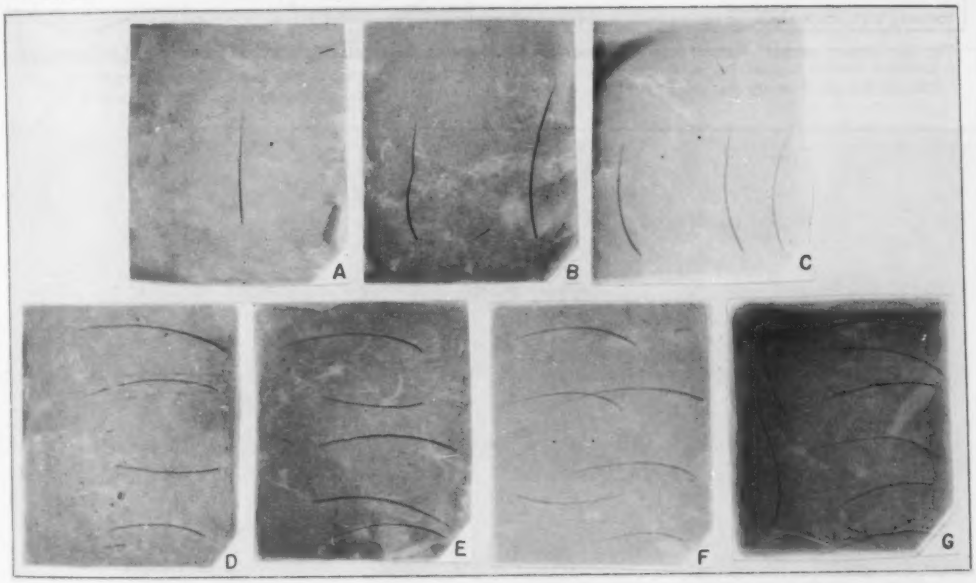


Fig. 2b - Radiograph shows the location of the bones as viewed from the top of the block.

previously prepared by the method used with sample 2. Bones were placed between each slab as indicated by small letters (fig. 3).

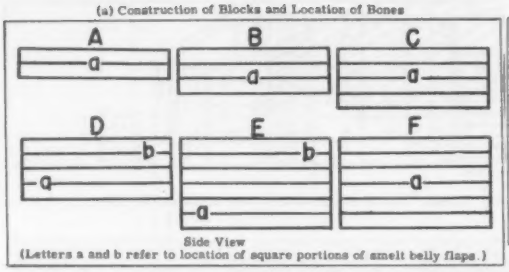
SAMPLE 4 - HADDOCK PORTIONS: An eviscerated scrod haddock weighing about 2,310 grams (fillets a and b of fig. 4) was split into two lengthwise portions leaving as many bones in as possible. A fillet (fillet c) was cut boneless and was placed over split portion a. The portions of fish arranged in this manner served as the test sample.

SAMPLE 5 - SMELT PORTIONS: A sea smelt was split into two lengthwise portions and arranged as shown in figure 5. Each portion weighed 160 grams, with the deepest thickness about $1\frac{1}{4}$ inches and the belly flap about $\frac{3}{8}$ of an inch.

SAMPLE 6 - OCEAN PERCH PORTIONS: Ocean perch were split lengthwise and three portions arranged as shown in figure 6.

SAMPLE 7 - WHITING BUTTERFLY PORTIONS: Three whiting were split butterfly fashion and arranged as shown in figure 7. The weight of each split butterfly

(a) Construction of Blocks and Location of Bones



Side View
(Letters a and b refer to location of square portions of smelt belly flaps.)

(b) Dimensions of Blocks and Sizes of Bones

Sample	Number of Slabs	Total Thickness in Inches	Dimensions of Bones in Millimeters
A	2	$\frac{6}{32}$	All bones averaged 0.35 to 0.45 millimeters in thickness.
B	3	$\frac{9}{32}$	
C	4	$\frac{6}{8}$	
D	4	$\frac{3}{4}$	
E	6	$1\frac{1}{8}$	
F	6	$1\frac{1}{4}$	

Fig. 3a - Square portions of smelt belly flaps were inserted between rectangular slabs to build up blocks of different sizes.

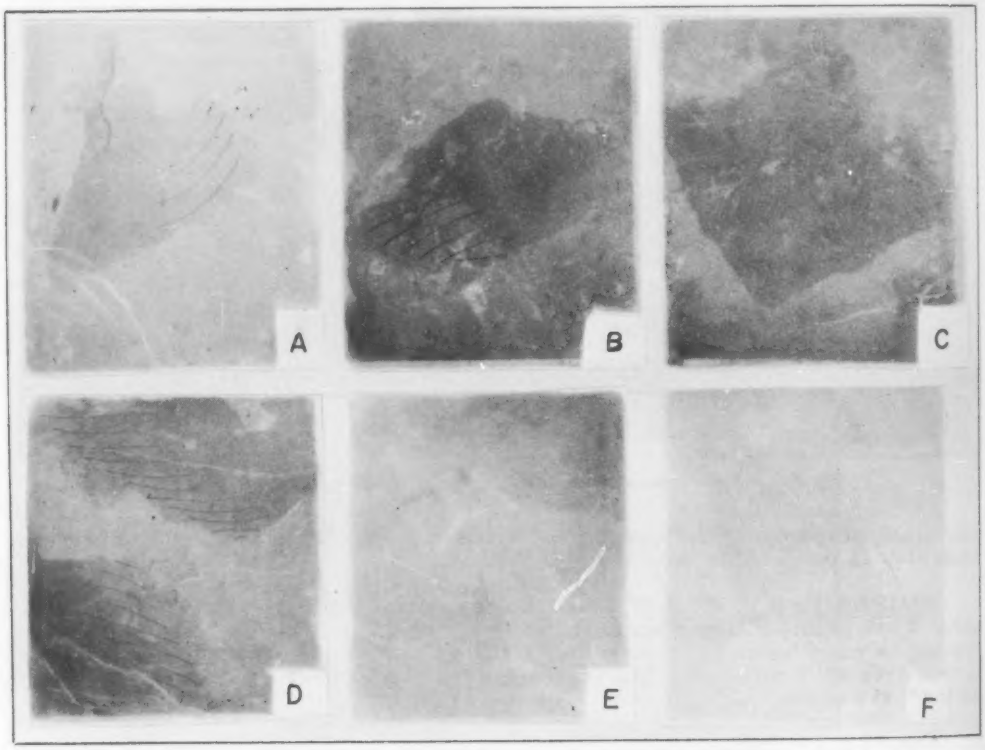


Fig. 3b - Radiograph shows location of bones in inserted smelt belly flaps as viewed from the top of each block. Note that Block C, the only exception, does not reveal the bones in the belly flap inserted between the third and fourth slab.

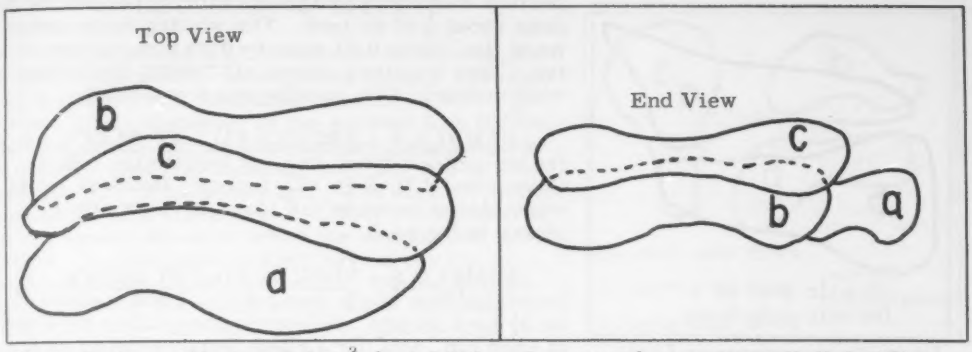


Fig. 4a - Portions a and b were each about $\frac{3}{4}$ of an inch thick--each one was cut from an eviscerated haddock weighing 2,310 grams, but leaving as many of the bones in as possible. Fillet c, which was about $1\frac{1}{8}$ inches thick and boneless, was placed over split portion a.

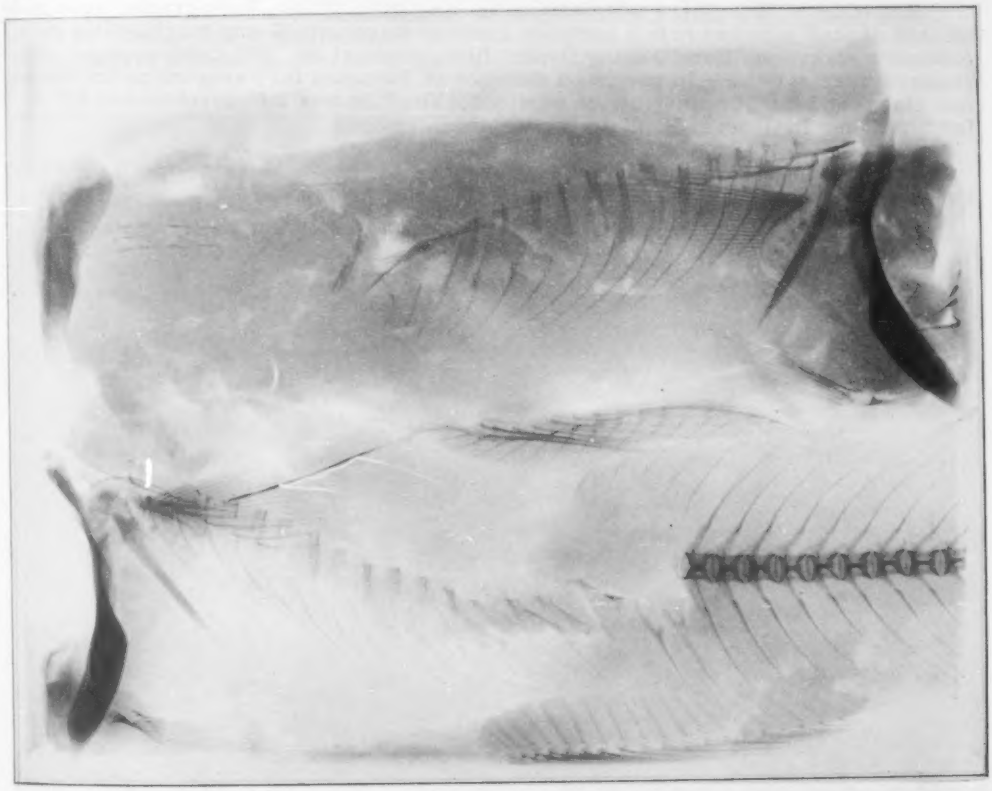
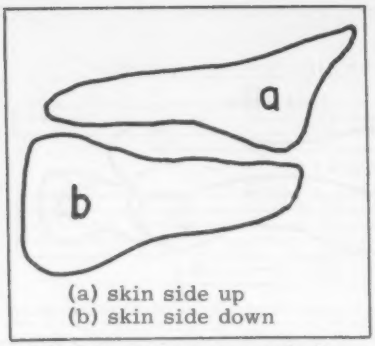


Fig. 4b - Top-view radiograph reveals the bones in split portions a and b. A portion with bones in and covered by a boneless fillet still clearly reveals the bones.



(a) skin side up
(b) skin side down

Fig. 5a - Shows the arrangement of split smelt portions.

portion was about 130 grams with the deepest thickness about $\frac{1}{2}$ of an inch. The whiting spine bones were flat, about 0.84 mm. by 0.25 mm. at the center. They were not major rib bones, but rather well-defined clear cartilaginous material.

SAMPLE 8 - FROZEN FILLET BLOCK: A frozen pollock block was cut lengthwise into 2 slabs about 1 by 9 by $11\frac{3}{8}$ inches. Haddock bones were placed between the slabs in the manner shown in figure 8.

SAMPLE 9 - FROZEN FILLET BLOCK: A frozen pollock block was cut into 2 slabs about $1\frac{3}{4}$ by $4\frac{1}{2}$ by 6 inches. Holes were bored into the sides at each cut, and the 2 slabs were reunited as in the original block (fig. 9). Standard size drills were used to produce holes (or voids) of the desired uniform diameter.

RADIOGRAPHIC AND FLUOROSCOPIC EXAMINATION: Radiographs were made of each of the 9 samples with a portable medical diagnostic X-ray machine (top performance 85 kv. at 25 ma.) using Dupont film, medical no. 508 double-coated. Exposures were at 60 kv., 10 ma., at a distance of 30 inches for 5 seconds on the blocks and slabs, and for 3 seconds on the portions. The film was then developed at 68° F. for 3 minutes in General Electric Super-Mix Developer.

Fluoroscopic examinations were made while the equipment was operating at 60 kv. and 5 ma., and in two cases where indicated at 60 kv. and 10 ma.

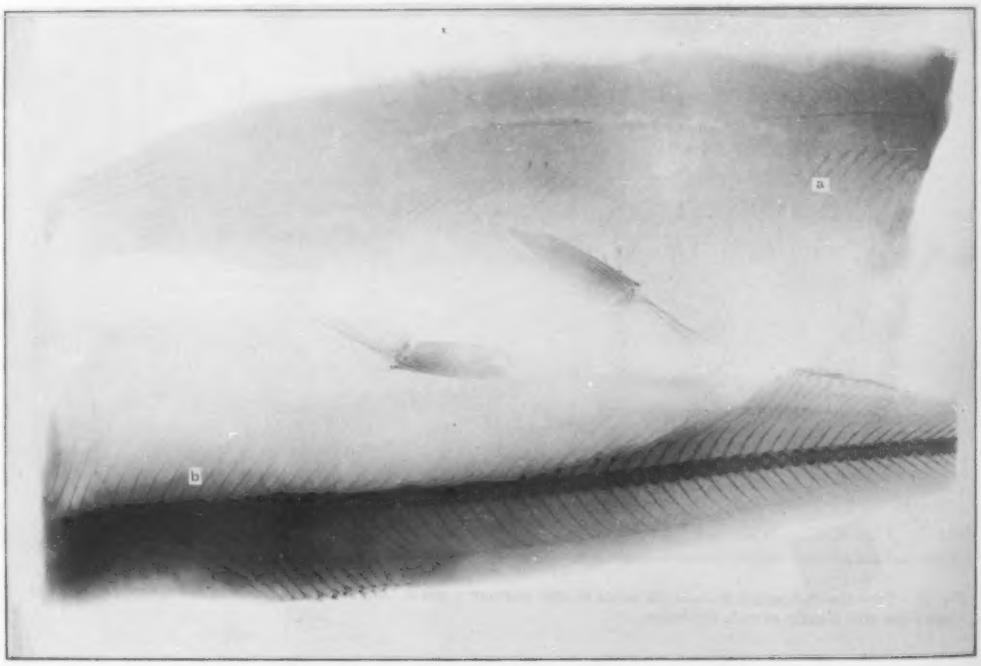


Fig. 5b - Radiograph shows the bones in a smelt split into two lengthwise portions.

DISCUSSION OF RESULTS

RADIOGRAPHY: Under the conditions previously described, radiographs clearly revealed all the bones and voids (air spaces) down to $\frac{1}{16}$ of an inch in diameter in the various fish fillets, blocks, and slab-section samples up to the largest depth used ($1\frac{13}{16}$ inches), with one exception--sample 3C. This subsample, $\frac{5}{8}$ of an inch thick, consisted of 4 slabs with a 7-bone rib section of a sea smelt placed between the second and third slabs. Radiographs did not reveal any bones, yet in sample 3F of this series, having a depth of $1\frac{1}{4}$ inches, the smelt bones were apparent (fig. 3F). We are unable to account for this discrepancy in the results.

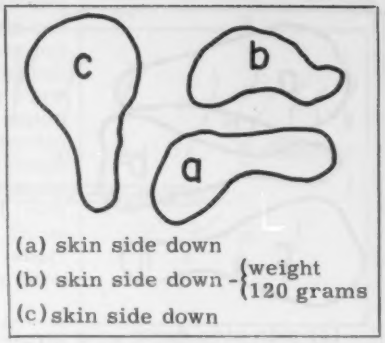
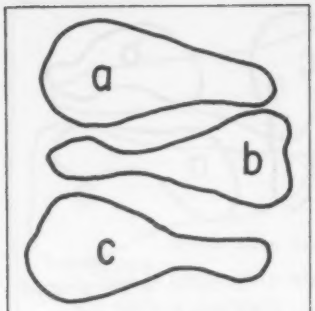


Fig. 6a - Shows the arrangement of split ocean perch portions.

FLUOROSCOPY: As was expected, fluoroscopic examinations did not reveal all the bones as clearly as did the radiographs. Furthermore, in the haddock block (fig. 1) and the slab sections (fig. 3) at 60 kv. and 5 or 10 ma., not a single smelt bone was visible, not even in the $\frac{1}{8}$-inch section (first step) of sample 1. Bones of the haddock portions (fig. 4) were plainly visible,

Fig. 6b - Radiograph clearly reveals the bones in the split ocean perch portions.



(a) skin side down
(b) skin side up
(c) skin side down

Fig. 7a - Shows arrangement of split whiting butterfly portions.

but were less visible in the double layer of portions. In the smelt portions (fig. 5) skin side up, the bones were not visible, but skin side down the bones were visible--though the belly-flap bones and the pectoral-fin bones were not. In the ocean perch portions in general, all bones were clearly visible, with the exception of 2 bone pieces in one portion (fig. 6b upper left-hand corner). Examination of this portion showed these 2 bone pieces were actually 9 mm. long by 0.52 mm. thick and 14.5 mm. long by 0.58 mm. thick and were no different in width than other bones in the fish. In the whiting portions, fluoroscopy revealed a diffuse mass in which none of the bones were visible except the spinal column.

All the voids up to $\frac{5}{32}$ of an inch in diameter were visible. Those smaller were not.

SUMMARY

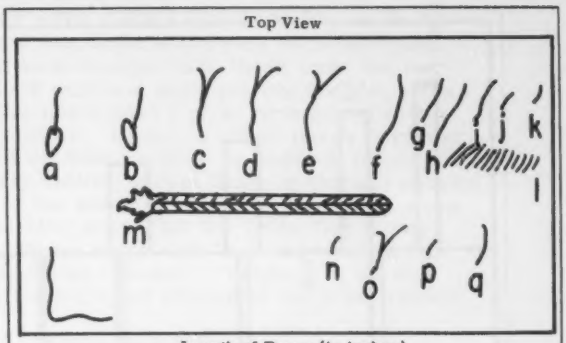
Use of a portable medical diagnostic X-ray apparatus under the conditions specified indicated the following:

1. Radiography revealed essentially all the bones present in split portions of haddock, ocean perch, whiting, and smelt; voids

Fig. 7b - Radiograph clearly reveals the bones in the split whiting butterfly portions.

(air spaces) down to $\frac{1}{16}$ of an inch in diameter placed in the center of frozen haddock blocks up to $1\frac{13}{16}$ inches thick were also revealed.

2. Fluoroscopy revealed at 60 kv. and 10 ma. all the haddock bones, but none of the smelt bones placed in haddock slabs up to a thickness of $1\frac{13}{16}$ inches. At 60 kv. and 5 ma., the haddock bones were clearly visible in the slab thickness of $\frac{15}{16}$ of an inch, but at a greater slab thickness of $1\frac{1}{2}$ inches, all bones were dull and barely visible.



Length of Bones (in inches)

(a) $2\frac{5}{8}$	(d) $1\frac{1}{4}$	(g) $1\frac{5}{8}$	(l) 12 bones and 1 cartilage
(b) $2\frac{3}{8}$	(e) $1\frac{1}{2}$	(h) 2	(m) spinal column section (p) $\frac{7}{8}$
(c) $1\frac{1}{32}$	(f) 2	(j) $\frac{3}{4}$	(n) $\frac{3}{8}$

(Letters a to q refer to bone segments and the dimensions of bones i, k, l, m, o, and q are not known.)

Fig. 8a - Frozen block of pollock fillets showing location of bones.

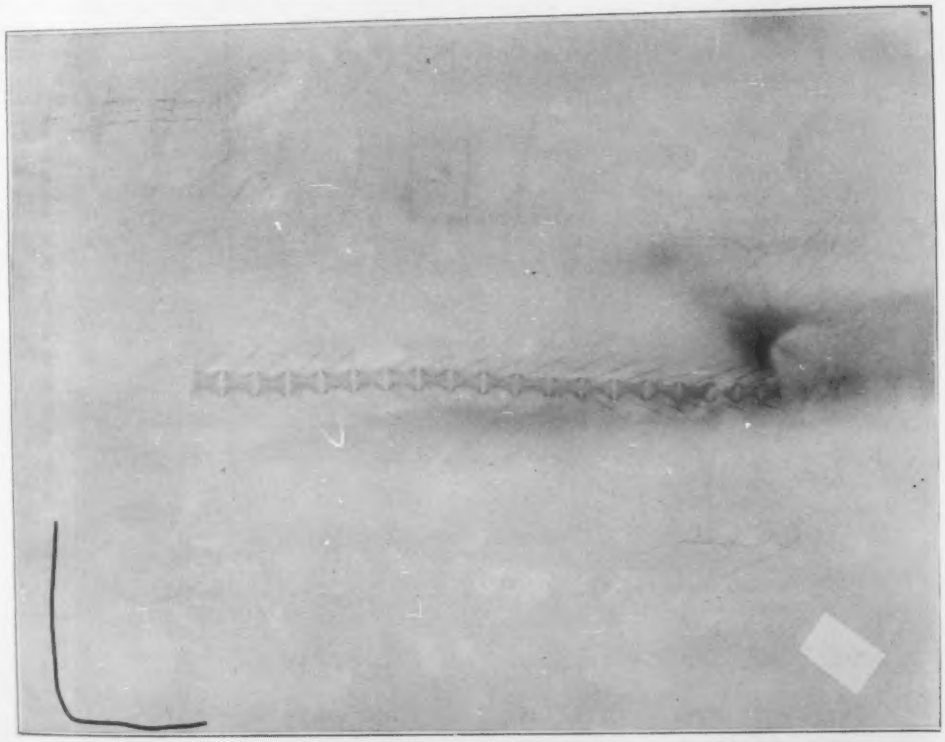


Fig. 8b - Radiograph indicates that nearly all the bones were clearly visible. A frozen pollock block was cut lengthwise into 2 slabs and bones were placed between the slabs in the manner shown.

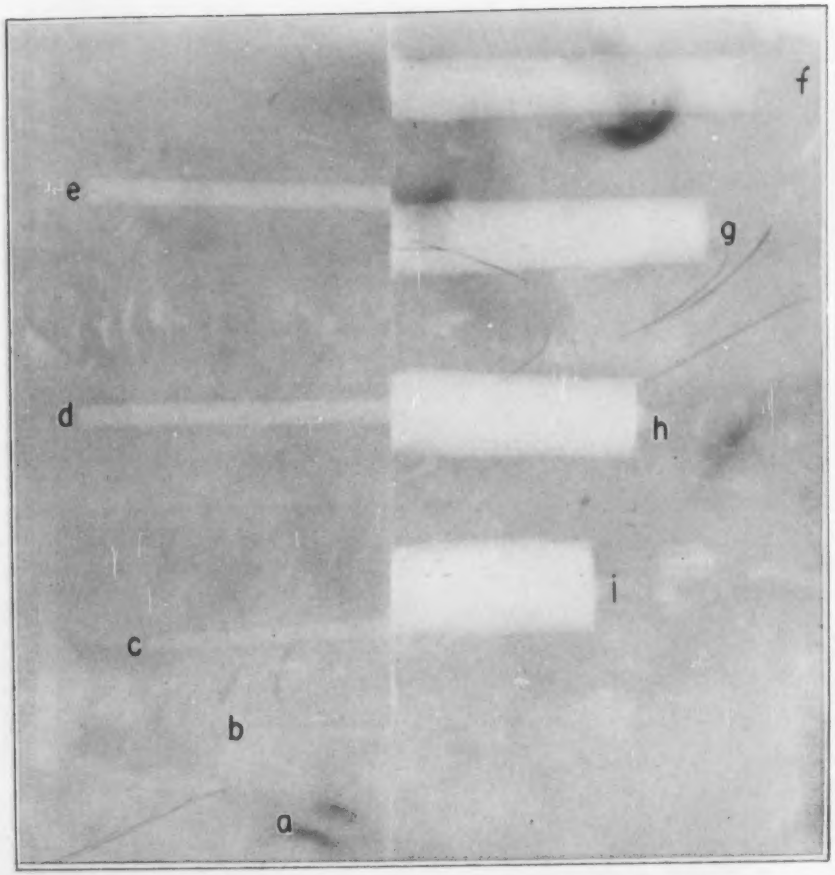
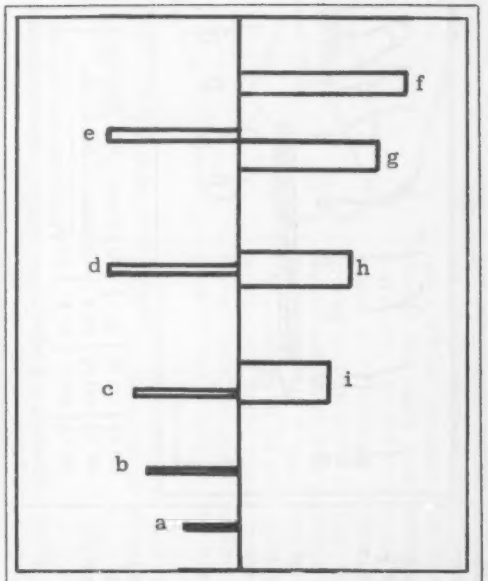


Fig. 9b - Top-view radiograph clearly shows all voids or air spaces except "a."



Diameter of Voids (in inches)

(a) $\frac{1}{16}$ x 1	(d) $\frac{7}{32}$ x $2\frac{3}{8}$	(g) $\frac{5}{8}$ x $2\frac{1}{2}$
(b) $\frac{3}{32}$ x $1\frac{11}{32}$	(e) $\frac{1}{4}$ x $2\frac{3}{8}$	(h) $\frac{3}{4}$ x 2
(c) $\frac{5}{32}$ x $1\frac{7}{8}$	(f) $\frac{1}{2}$ x 3	(i) $\frac{7}{8}$ x $1\frac{5}{8}$

Fig. 9a - A frozen pollock block was cut into 2 slabs. Holes were bored into the two sides at each cut and the 2 slabs were reunited as in the original block.

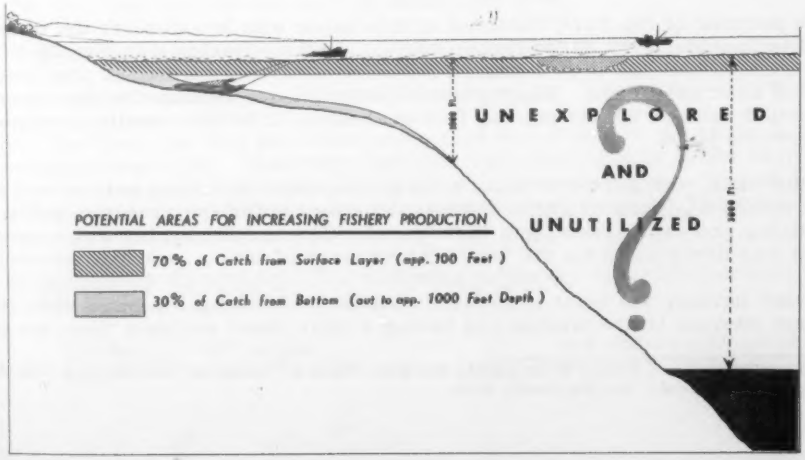
In haddock blocks they were visible only in blocks up to $1\frac{1}{8}$ inches thick, and there was little difference between bones located deeper in the meat compared to those near the surface. Bones in haddock portions were plainly visible, even in a doubled-up portion (each part $\frac{3}{4}$ of an inch thick) with a total thickness of $1\frac{1}{2}$ inches. Bones in ocean perch portions did not appear as well defined as those in haddock fillets, although all were clearly visible except those in the tail section. The large rib bones in the smelt portions were visible when they were placed skin side down, but the belly-flap bones were not visible. No bones were visible in the whiting fillets (except the small spinal column). Voids $\frac{3}{32}$ of an inch in diameter and smaller were not visible in the frozen block.

RECOMMENDATIONS

The X-ray equipment used was designed for diagnostic purposes only and was therefore limited in capacity and not necessarily suitable for the purpose of detecting bones and air spaces in fish and fish blocks. The results of these preliminary tests, nevertheless, seemed rather encouraging even with the use of this particular equipment. The radiographs were entirely satisfactory for detecting bones and air voids in the commercial species of fish used. It is unlikely, however, that radiographs will find practical application with the fillet or frozen-block industries as a routine quality-control measure. Fluoroscopy could be applied readily, provided it furnished the required degree of accuracy and a reasonable degree of ease of operation. It is recommended, therefore, that further tests with greater capacity and more versatile X-ray fluoroscopic instruments be encouraged to develop equipment and procedures which can be used commercially for the detection of bones in fish fillets and bones and air spaces in frozen fish blocks.

ACKNOWLEDGMENT

Acknowledgment is made to the General Electric X-Ray Laboratory of Boston, Mass., for the use of the X-ray facilities and equipment and to C. J. Haller and R. H. Fletcher for their technical aid and for their assistance in the preparation of the radiographs.


UNEXPLORED
AND
UNUTILIZED
POTENTIAL AREAS FOR INCREASING FISHERY PRODUCTION
70% of Catch from Surface Layer (app. 100 Feet)
30% of Catch from Bottom (out to app. 1000 Feet Depth)

HOW TO COOK FROZEN FISH WITHOUT PRETHAWING

Part I - Determination of Optimum Internal Temperature for Baked Frozen Halibut Steaks

By Kathryn L. Osterhaug* and Marian M. MacFarlane**

CONCLUSION

The internal temperature range for baked frozen halibut steaks that was most consistently acceptable was that from 155° to 160° F. Consequently, for purposes of establishing time and temperature relationships for baking frozen halibut steaks without prethawing, this temperature range should be used as the standard for doneness.

BACKGROUND

The growth of prepackaged foods of all kinds has been tremendous in the past few years. Keeping pace with the myriad numbers of these products--which range from dry cereal, crackers, and cookies through fresh meats and cheese to all types of fresh fruits and vegetables--is the one-pound package of frozen fish fillets and steaks. The big selling point for prepackaged foods in meal-size containers has been convenience. Whereas this has undoubtedly been an important aid in the sale of fresh items and in the sale of frozen products for which no prethawing is required, the sale of frozen fish steaks and fillets has been retarded to some extent by the lack of specific reliable instructions for cooking without prethawing.

Since no experimental work has been published on this problem, a study was undertaken at the Service's Seattle Technological Laboratory. The first objective of the study was to establish for "doneness" a standard that would be reproducible. In the past, fish has been considered done if, when tested with a fork, it flaked easily. This criterion is much too indefinite for any type of controlled laboratory experiments. Thus, a more objective method of judging doneness was needed for the present work.

A logical reference point for determining the doneness of protein foods is internal temperature. Thus, the work on meat cookery in other laboratories has been based on final internal temperature as has the work on salmon steaks by Helen Charley (1952).

The purpose of the work reported in this paper was to establish the optimum internal temperature for baked frozen halibut steaks. Baking was chosen as the cooking method because it is a standard method involving conditions that can be controlled and reproduced. Halibut steaks were chosen because halibut is one of the principal species of fish sold as frozen steaks. It is also readily available throughout the year.

In the work, two series of tests were performed: The first series was of a general nature designed to explore the various aspects of the problem and to provide training and experience for a taste panel. The second series was more specific and was designed to fix the temperature range of doneness within narrow limits.

In each series, the basic procedure consisted of baking frozen halibut steaks to various internal temperatures and having a taste panel evaluate them for palatability.

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FIRST SERIES OF TESTS

In the first series of tests, the extreme temperature limits for doneness were tentatively established as ranging from 130°-175° F. Flavor scores were directly proportional to the rise in temperature within this range, whereas juiciness and texture scores were inversely proportional to the rise in temperature. The average scores appeared to fall into natural groupings from which four temperature ranges were selected for use in the second series of tests.

SECOND SERIES OF TESTS

In the second series, the panel members were asked to give a judgment based on the composite effect of flavor, texture, and juiciness rather than to classify their judgments according to these individual palatability components. Enough tests were conducted so that a total of 54 judgments for each temperature range could be collected and the final scores could be analyzed statistically. The average score and the standard error were determined for the scores in each temperature range.

EXPERIMENTAL PROCEDURE

The halibut steaks used in the tests were purchased at a local retail market. For each test, one-inch-thick steaks were sliced in succession from a single fish. Each steak was wrapped in aluminum foil and frozen until needed.

PREPARATION FOR COOKING: The frozen steaks were unwrapped and then brined in a solution of ½ cup of salt in 1 quart of water for 2 minutes, drained, and arranged on shallow tin-coated steel baking pans. Glass-covered constantan (nickel-copper alloy) thermocouples were inserted into the center of the steaks equidistant from top and bottom, with as little glass exposed as possible to prevent the conduction of heat into the steak by the glass.

BAKING PROCEDURE: The prepared steaks were baked in a standard household-type electric-range oven, which had been preheated to 350° F. All of the samples were placed in the oven at the same time but were removed individually as they reached the predetermined temperatures corresponding to one of the following ranges: (a) 130°-135° F., (b) 145°-150° F., (c) 155°-160° F., (d) 170°-175° F.

TEMPERATURE RECORD: The thermocouples inserted in the fish were attached to a temperature-recording device so that a continuous temperature record was made for each sample. The temperatures of all steaks were below freezing (26°-29° F.) when the steaks were placed in the oven.

PRESENTATION OF SAMPLE: As the steaks were taken from the oven, after being baked, the skin and bones were removed, and the meat was broken up enough so that it could be placed in 1,000-milliliter beakers. The beakers were coded, covered with aluminum foil, and held in a 130° F. oven until all 4 samples were ready. The fish was then shredded and mixed thoroughly in the beakers to insure a homogeneous sample. Individual samples were removed to coded warmed 50-milliliter beakers, and each panel member was presented with a tray of 4 of the coded beakers corresponding to the four temperature ranges. The panel members were asked to arrange the samples in order of preference.

GRADING OF SAMPLES: The following arbitrary numerical scores were assigned according to the order of choice:

1st choice - 40 points	3rd choice - 20 points
2nd " - 30 "	4th " - 10 "

In the case of a tie, the points each sample would have received, if one sample had been preferred over the other, were added together and divided by two. Each sample was then given this score.

TASTE PANEL: The taste panel was drawn from a group of 10 members of whom 5 or 6 were available for each test. The members were experienced by preliminary work and could quite consistently distinguish doneness in samples differing by only 10° F. in internal temperature.

RESULTS

The average score and standard error found for each temperature range are presented in table 1.

Table 1 - Relationship Between Palatability Score and Internal Temperature Reached During Baking of Frozen Halibut Steaks

Internal Temperature of Steaks	Palatability Score of Steaks[1/]	Standard Error of Palatability Score
Degree Fahrenheit	Arbitrary Points	Arbitrary Points
a. 130 - 135	20.1	±1.59
b. 145 - 150	26.9	±1.41
c. 155 - 160	27.6	±1.09
d. 170 - 175	25.6	±1.69

1/ Each score is the average of 54 judgments.

Range (a)--130°-135° F.--had the lowest average score, indicating that it was the least satisfactory of the temperature ranges used.

Range (d)--170°-175° F.--had a higher average score than range (a), but the standard error was larger, indicating a marked disagreement among the tasters in their judgment of samples in this temperature range. Tasters who had been found in series I to be influenced largely by flavor graded these samples high, whereas those who had been found more sensitive to texture and juiciness graded them very low.

Ranges (b)--145°-150° F.--and (c)--155°-160° F.--had average scores within 0.7 of a point of each other, but range (c) had a lower standard error. Range (c) also had the highest average score of the four ranges. These facts indicate that there was more general agreement between the tasters on this temperature range than on any of the other three.

LITERATURE CITED

Charley, Helen
1952. Effects of Internal Temperature and of Oven Temperature on the Cooking Losses and the Palatability of Baked Salmon Steaks. Food Research, vol. 17, no. 2 (March-April), pp. 136-143.

DO YOU KNOW

That a series of experiments to test improved methods of carrying shrimp in crushed ice disclosed that no measurable differences in quality could be detected among the shrimp held in ice with 3 different sizes of particles: "snow," "rickey," or "flake."

--Food Field Reporter, December 14, 1953

EFFECT OF COOKING OIL QUALITY AND STORAGE CONDITIONS ON THE KEEPING QUALITY OF FROZEN FRIED FISH STICKS

During the course of research by the Service's Boston Fishery Technological Laboratory into the many factors affecting the quality and the storage life of frozen fried fish sticks, studies were made on the effects of using old "spent" cooking oil. Two lots of samples were prepared from fish sticks (cod) cooked in relatively fresh corn oil (free fatty acid content, 0.24 percent by weight) and in old "spent" corn oil (free fatty acid content, 2.5 percent) that had been in constant use for 120 hours. In all other respects, insofar as possible, the samples were identical. Each lot of samples was then split into three groups for frozen storage under three different conditions to study the effects of such conditions on quality and storage life.

Table 1 - The Effects of Quality of Cooking Oil and of Storage Conditions on the Storage Life of Frozen Fried Fish Sticks

Lot No.	Frying Oil	Storage Condition 1/	Quality Rating Months 0	2	5	8	12	Probable Storage Life
1	Fresh corn oil, free fatty acid content of 0.24 percent by weight	(A) Mild	Very Good	Good	Good	Fair	Fair	Approximately 8 months
		(B) Extremely Severe	Very Good	Good	Good	Fair	Poor	
		(C) Extremely Mild	Very Good	Good	Good	Fair	Fair	
2	"Spent" corn oil, free fatty acid content of 2.5 percent by weight	(A) Mild	Good	Fair	Poor	Poor	-	Less than 5 months
		(B) Extremely Severe	Good	Good	Fair	Poor	-	
		(C) Extremely Mild	Good	Good	Poor	Poor	-	

1/ Condition (A) - Packages in sealed master cartons directly exposed to continuous air blast (-3° to +2° F.) of 50 feet per minute.
Condition (B) - Individual packages directly exposed to continuous air blast (-10° to 0° F.) of 900 feet per minute. (Air temperature during the 3-times-daily defrost cycle of 15 minutes' duration reached +15° F.)
Condition (C) - Packages in sealed master cartons inside large draft-free box in a still-air cold room (0° to +5° F.).

The storage conditions were (A) mild, (B) extremely severe, and (C) extremely mild. (See table 1 for description of storage condition.) Three taste tests were performed by an experienced panel on each of the six groups of samples initially and after storage for 2, 5, 8, and 12 months.

Table 1 shows the results of the studies. No consistent reproducible differences in quality of the fish sticks due to differences in storage conditions could be detected by the panel. The quality of the packaging was evidently sufficiently good to protect the samples under the most severe conditions. The three groups of fish sticks fried in fresh corn oil remained in a marketable condition for 8 months. The three groups of fish sticks fried in "spent" oil were considered to be of poor quality and unmarketable after only 2 to 5 months of storage. The very dark, lifeless color and the oily-soggy texture of the coating of the sticks was very displeasing to the panel.

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FRESHNESS TESTS FOR TUNA

The University of Washington School of Fisheries[1/] is studying the relative value of the following chemical tests as a measure of freshness of various species of fish: volatile acids, volatile-reducing substances, volatile bases, hydrogen sulfide and trimethylamine. The first species of fish to be investigated is tuna, samples of which were stored in ice and at room temperature. At suitable storage intervals and as spoilage progressed, samples of the raw fish were frozen while other samples at the same stages of spoilage were canned.

Analyses for trimethylamine and for volatile acids have been completed on these tuna series. Trimethylamine failed to develop in sufficient quantities to form the basis of a suitable test in these series. Volatile acids did develop as spoilage proceeded and a fairly good correlation (although not completely consistent in all cases) occurred. The analyses for volatile bases, hydrogen sulfide, and volatile-reducing substances on the tuna series are now being made and will be reported later.

1/ This study at the University of Washington under a contract from the U. S. Fish and Wildlife Service is financed from funds made available by Public Law 466, 83rd Congress, approved July 1, 1954, popularly known as the Saltonstall-Kennedy Act.

COMMERCIAL-SCALE FREEZING-FISH-AT-SEA TRIP MADE BY DELAWARE

The experimental freezer trawler Delaware returned October 9 from a 13-day cruise (No. 10) in the Georges Bank area with about 100,000 pounds of high-quality brine-frozen groundfish. The frozen catch consisted of 42,000 pounds of large haddock, 25,000 pounds of scrod haddock, 25,000 pounds of pollock, 4,000 pounds of flounder, and 4,000 pounds of cod. In addition, about 3,000 pounds of fresh iced fish were aboard.

During the 13-day trip, fishing operations were conducted for 24 hours a day, according to the commercial practice of the Boston trawler fleet. A total of 100 sets were made, averaging 1,000 pounds of market fish per set. However, $2\frac{1}{2}$ days of fishing time were lost in taking two sick crew members ashore.

OPERATION OF REFRIGERATION SYSTEM: The experimental brine-freezing system operated very satisfactorily during the trip, freezing at a rate of approximately 850 pounds of haddock per hour. All automatic controls on the absorption refrigeration plant functioned properly and the only attention required was to check the temperature and pressure gauges once an hour. The low-temperature brine thermostat and solenoid valves shut down the brine cooler when the brine temperature reached 0° F. The pressure switch on the brine-pump discharge prevented the brine cooler from freezing in case of brine-flow stoppage.

All freezing was done between brine temperatures of 5° and 10° F. Loads consisting of 2,000 pounds of scrod haddock, when put into the freezer, caused only a 3° rise in brine temperature, after which the brine returned to its original temperture within 2 hours and 20 minutes. The largest daily catch consisted of over 18,000 pounds of scrod haddock, of which fish from individual sets were placed into the brine freezer immediately or within 2 hours after being caught.

When freezing large fish, such as pollock and large cod, the freezing rate dropped to about 550 pounds per hour. The brine-freezing system aboard the Delaware is subject to certain definite refrigeration losses. When freezing the larger fish, these losses increase per pound of fish frozen, thereby giving a decreased freezing rate. This is a function of the fish thickness and would be the same for any refrigeration system.

It was possible to obtain data on the cost of operating the freezer during the trip. A fuel-oil meter was used to measure the fuel used in the steam boiler on the vessel. The absorption system, freezing at full capacity and maintaining two fish-holds at 8° F., used a maximum of 101 gallons of oil per day. The motor driving the freezer baskets, brine pump, antifreeze pump, circulating pump, and aqua pump used 7.74 kilowatts. In order to produce 7.74 kilowatts, the diesel generating set on the vessel used about 17 gallons of fuel oil per day (calculated figures). Therefore, the total fuel oil used was 118 gallons per day. At a price of 10 cents per gallon, the cost of operating the system at maximum capacity was $11.80 a day.

In order to preserve 100,000 pounds of fresh (unfrozen) fish on a similar-size trawler, about 40 tons of ice are required at a cost of $6.00 per ton. Therefore, assuming a 12-day trip, about $240 would be spent for ice. In a 12-day trip on the Delaware the maximum refrigeration cost would be $11.80 a day. (The actual cost would be somewhat less because the system would not be operating at full capacity all the time.) This would give a total refrigeration operating cost of not more than $142 for the trip. Therefore, the cost of freezing and storing 100,000 pounds of fish during a 12-day trip would be $98 cheaper than the cost of ice necessary to preserve 100,000 pounds of fresh fish during the same period of time. This saving partially offsets the cost of maintaining and purchasing the freezing equipment.

HANDLING ABOARD THE VESSEL: The fish, after being caught, were put into bushel baskets which were dumped into the cylindrical freezer baskets. A board on which were mounted 11 dummy clocks and 1 real clock was used to record the freezing time of the various loads. The procedure was as follows: The freezer consists of 11 cylindrical metal-mesh baskets which have a number stamped on their sides. As each basket was loaded, the dummy clock for that basket was advanced to the time when the fish should be unloaded from the basket. Then when the time shown by the real clock and the dummy clock coincided, the fish were unloaded and conveyed by metal chutes into either the after or forward refrigerated hold. In many cases the baskets were unloaded and loaded at the same time. It was possible to unload 2,000 pounds of frozen fish from the freezer into the fish hold and load an additional 2,000 pounds of fish from the checkers into the freezer within 30 minutes.

An observer from Northeastern University was aboard during the trip to obtain pertinent data for the economic study of freezing-fish-at-sea being conducted by that University under a contract with the Fish and Wildlife Service.

The vessel was unloaded at the Fish and Wildlife Service laboratory at East Boston. Large amounts of the scrod and haddock will be used for a consumer-acceptance test of the brine-frozen fish which will be conducted by Northeastern University. The remainder of the fish will be used in other research projects being conducted by the laboratory.

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FEEDING STUDIES WITH MENHADEN PRESS CAKE

In the manufacture of menhaden fish meal, the raw fish are first cooked with direct steam to break down the tissues so that the oil and stickwater can be removed. The cooked fish are then pressed in continuous screw-type presses to remove as much oil and stickwater as possible. The partially-dried material at this stage contains 45-50 percent moisture and is called press cake.

The proximate composition varies depending on the size of fish, quality of the raw material, and the efficiency of the cooking and pressing operations. An average composition would be about 55 percent dry matter--35 percent protein, 5 percent fat, 3 percent nitrogen-free extract, and 12 percent minerals. The raw menhaden contains an appreciable amount of thiaminase, which means that this fish has to be cooked before feeding to animals. The press cake has already been cooked so the bioassay shows very little thiaminase present. The press cake contains considerable fish bones which have not been broken down, and which may decrease consumption by some species of animals.

In order to obtain information on the nutritive value of this product, six weanling rats were allotted to the experiment on September 15, 1953. At first they were fed press cake alone as much as they would eat. It was soon evident that the diet was not complete enough to permit growth. The rats did not gain in weight during the first two weeks, so the diet was then changed. In addition to the press cake, they received free-choice fresh cabbage and a high-calorie diet made up of starch, vegetable shortening, and cod-liver oil in the proportion of 80, 16, and 4 parts by weight, respectively. The rats then started to grow normally. The press cake which was stored frozen was eaten with relish. The bones were cleaned of meat and left in the feeding dishes.

A number of litters were born, the first on January 15, 1954, but quite a few of the young died soon after birth. This seemed to be more a question of maternal care than due to diet and is a common experience with the breeding rats of the stock colony in this laboratory. The litters that were raised grew satisfactorily without abnormal mortality.

At the present time there are three fourth-generation litters. These were born on August 17, August 29, and September 22 of this year and there are five to eight siblings in a litter.

The data indicate that no young or adult rat has died from mechanical obstruction by bones. All of the animals now living are sleek and healthy looking. In two instances, males belonging to third-generation litters showed nervous symptoms that might be described as a "fit." The males were given a solution of thiamine and the seizures stopped. After the treatments were suspended the seizures returned.

One of the males seemed to lose muscular coordination and died after about three weeks. No gross unusual conditions were found during necropsy. The seizures of the other male continued for a few weeks after which he returned to normal. It is not known whether the diet did not supply some nutrient needed to alleviate a physiological stress or whether the deficiency was of genetic origin in these highly-inbred rats. As mentioned previously, the fourth-generation rats appear very healthy at the present time, namely, at the age of one or two months.

In summary, menhaden press cake, a high-calorie diet, and fresh cabbage have been fed free-choice to rats, for a period of about two years. At the present time these include fourth-generation litters. No difficulty has been experienced due to the numerous bones in the press cake. The rats have been generally very healthy. Two male rats of the third generation have had seizures apparently of nervous origin. It is not known whether these were due to a deficiency of the diet or were of genetic origin. The press cake seems to be a satisfactory source of protein and possibly of some vitamins for normal growth and reproduction. The experiments are being continued.

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PILOT REDUCTION PLANT

A pilot reduction plant supplied and maintained by a contractor at Reedville, Va., has been operated in September and October 1955 by staff members from the Service's Fishery Technological Laboratory, College Park, Md. This project is financed by Saltonstall-Kennedy Act funds.

The pilot plant (consisting of a direct steam cooker, continuous screw-type press, and a hot-air dryer) was designed to permit the study of some processing variables that may affect the nutritive quality of the fish meal which is produced.

Menhaden are the only fish which are processed in the Reedville area. The variables studied were limited mainly to the effect of size and quality of fish on the resultant meal. A few studies were done on the degree of cooking of the fish and the temperature in the dryer.

All samples of meal will be fed to poultry to determine the nutritive quality of the meal. Until these tests are completed, it will not be possible to draw any conclusions on the effect of processing variables on nutritive quality of meals made in these tests.

CONFERENCE OF CONTRACTORS DOING RESEARCH ON SOUTHERN OYSTERS

A conference was held on October 17 to discuss the research work on Southern oysters financed by Saltonstall-Kennedy Act funds. Staff members from the Florida State University, Louisiana State University, and Tulane University, and a representative of the U. S. Fish and Wildlife Service were present at the conference in Tallahassee, Fla. The previous conference was held in May in New Orleans.

The staff at the University of Florida reported on frozen storage tests with cooked oyster dishes, and sterilization of raw oysters using radioactive cobalt. Those from the Louisiana State University reported on frozen storage tests with raw oysters treated in various ways. The men from Tulane University described tests designed to explain the physiology of the body-fluid losses of oysters. The Southern oysters lose substantially more weight through this process than do oysters of the same species from other sections of the East Coast. The Service representative outlined the chemical studies that had been done to determine the proximate composition of samples collected at monthly intervals from the important producing areas in the Gulf and South Atlantic.

Detailed data cannot be given on any of the work at present since no research reports have been published. It is expected that several reports from each unit will be submitted before the end of the contract year which will be in January and February 1956.

COLD-STORAGE LIFE OF FRESH-WATER FISH--NO. 2 [1/]

(Yellow Perch, Crappie, White Bass, Utah Chub, and Sqawfish)

Although fresh-water fish form a substantial segment of the domestic fish supply, only limited data are available on their cold-storage life. These data are of value to the producer in adopting proper packing preocedures and in evaluating marketing problems, and to the sport fisherman in preserving a portion of his catch.

1/ This work was carried out under a project financed in part by the Refrigeration Research Foundation.

Furthermore, studies on the freezing and cold-storage keeping characteristics of species not now being extensively used may ultimately lead to their wider utilization. For these reasons, a project to develop this type of information was started at the Seattle Technological Laboratory about four years ago. The first report of the findings was published in the September 1954 Commercial Fisheries Review. In the present report, the results of the cold-storage tests on additional samples and with new species are presented.

The fish used in this study were collected in Wisconsin, Minnesota, Montana, and Washington. Samples of each species of fish were stored in the round. Some were also stored as dressed fish.

The fish, which were in five lots, were shipped from the collection points to the Seattle laboratory. Three of the lots were shipped iced; two, frozen.

Table 1 - Cold-Storage Life of Certain Fresh-Water Fish Stored at 0° F.

Description of Samples						Condition of Samples Stored at 0° F. for:				
Common Name	Scientific Name	Source	Date Caught	Method of Shipping	Packaging Used for Storage	0 Months	3 Months	6 Months	9 Months	12 Months
Yellow perch	Perca flavescens	Lake Winnebago, Wisconsin	July 1953	Iced	In the round, packed in polyethylene bags	Mild flavor; tender; slightly dry after cooking (good)	Texture very firm and slightly tough; slightly bitter flavor noted in parts of belly flaps but flavor otherwise good	Quality unchanged (good)	Quality unchanged (good)	Quality unchanged (good)
Crappie	Pomoxis annularis	Two Rivers Lake, Benton County, Minnesota	October 1953	Iced	In the round, ice-glazed, packed in polyethylene bags	Meat white; tender, firm, and flaky; flavor bland but pleasant (excellent)	No change noted	Some off-flavor in belly flaps; otherwise good	No further change (good)	Discontinued
White bass	Lepibema chrysops	Lake Winnebago, Wisconsin	July 1953	Iced	In the round, packed in polyethylene bags	Appearance good; texture firm, tender, and moist. Flavor mild and sweet (excellent)	Good	Some off-flavor in belly flaps; otherwise good	Some discoloration and off-flavor in belly flaps; otherwise good	Same as at 9 months
					In the round, packed in quart jars, flooded with tap water	Same as above	Good	Same as above	Same as above	Same as above
					Dressed fish, packed in quart jars, flooded with tap water	Same as above	Good	Same as above	Same as above	Same as above
Utah chub	Gila atraria	Hebgen Lake, Montana	July 1953	Frozen	In the round, ice-glazed, packed in polyethylene bags	White meat extremely soft with many small bones; good flavor (acceptable)	Texture soft; white meat flat flavor; dark meat strong flavor	White meat flat; dark meat extremely strong flavor	No further change	No further change
					Dressed fish, glazed, packed in polyethylene	Same as above	Belly cavity discolored; texture soft; white meat flat flavor; dark meat strong flavor	Same as above	Discontinued	
Squawfish	Ptychocheilus grandis	Drano Lake, Washington	February and June 1953	Frozen	In the round, glazed, wrapped in cellophane	White, flaky, tender meat; many small bones; mild flavor	White meat flat flavor; dark meat and belly flaps off-flavor	White meat flat; dark meat extremely strong flavor; belly flaps off-flavor	Same as at 6 months	Discontinued

The three lots of iced fish were shipped express and maintained in a chilled condition until their arrival at the laboratory. The time elapsing between catching and delivery at the laboratory was not more than 5 days. At the laboratory, the fish were washed, prepared for freezing, and frozen in a blower-type freezing unit at a temperature of -20° F. After being frozen, they were placed in storage at 0° F. The methods of packaging the individual samples are shown in table 1.

The two lots of frozen fish had been frozen in commercial freezers, packed in suitable containers with dry ice, shipped to Seattle by express or by air freight, and received in good condition. Part of the lot of frozen Utah chub (and iced white bass) was dressed when received. The frozen dressed Utah chub were thawed in cold running water only until soft enough to handle and were then packaged for the cold-storage tests.

Table 1 gives data on the cold-storage life of all five lots of fish.

CONCLUSIONS

The yellow perch, which were frozen in the round, were of good quality throughout the 12-months' storage test. These results were the same as those obtained with another lot of yellow perch in a previous test.

The crappie, which were frozen in the round, were of good quality for more than 9 months. Samples were not available to carry the tests beyond this period.

White bass, packed in the round in polyethylene bags or in glass jars or as dressed fish in glass jars, were of good quality throughout the 12-months' storage period.

Utah chub, packaged in polyethylene bags either in the round or as dressed fish, were of fair quality up to 4 months. At 6 months, the dark meat had an objectionable off-flavor, and the white meat was flat; no further changes were noted during the test period of 12 months.

The squawfish, frozen in the round, were off-flavored in the dark meat and belly flaps at 3 months. At 6 months, the dark meat had a strong objectionable off-flavor.

Additional studies on such variables as seasonal changes, methods of handling, and methods of packaging and storing are necessary before general conclusions can be drawn on the cold-storage life of these species of fresh-water fish.

SPECIES CURRENTLY UNDERGOING STORAGE TESTS

In addition to the fish listed in table 1, the following species are currently undergoing storage tests, which will be completed by February 1956:

(1) Sheepshead (Aplodinatus grunniens) taken from Lake Winnebago, Wis., in January 1954.

(2) Chub (Leucichthys sp.) taken from Lake Michigan in August 1954.

(3) Whitefish (Coregonus clupeaformis) taken from Red Lake, Minn., in August 1954.

(4) Northern pike (Esox lucius) from Litchfield, Minn., February 1955.

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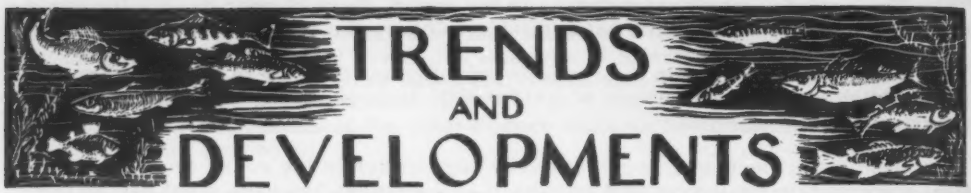
CONTINENTAL SHELF

The continental shelf is a submarine plain of varying width, forming a border to the continents. The water above it is comparatively shallow, somewhere between 300 and 450 feet. The shelf varies greatly in its width and slope. In some cases, as off mountainous coasts, the shelf may be almost absent, whereas off glaciated coasts and off the mouths of large rivers and areas of broad lowlands, the shelf may be very wide. For the world as a whole, the width of the shelf is approximately 30 miles, varying from zero to 800 miles. This extremely wide shelf is in the North Polar Sea along the coast of Siberia. The rapid descent of the continental shelf to the ocean depths is the continental slope.

--Sea Secrets, January 18, 1955,
The Marine Laboratory, University of Miami,
Coral Gables, Fla.



Additions to the U. S. Fleet of Fishing Vessels

First documents as fishing craft were issued to 50 vessels of 5 net tons and over during August 1955, according to the U. S. Bureau of Customs. This was an increase of 8 vessels (19 percent), compared with the 42 fishing craft documented for the first time during the corresponding month of 1954.

All areas, with the exception of the Gulf and Chesapeake areas, showed increases in newly-documented vessels. The New England, Middle Atlantic, and Great Lakes areas each had additions of 1 or 2 vessels to their fishing fleets during August of this year, compared with none during the corresponding month of 1954. The Chesapeake area had 5 newly-documented vessels--the same as reported for August 1954. The Pacific and Alaskan areas each had 3 more vessels during August 1955 than during the same month of last year, while the South Atlantic area showed a gain of only 1 vesssel. The Gulf area had 14 newly-documented vessels during August--a drop of 18 percent as compared with the 17 additions reported for August 1954.

U. S. Vessels Issued First Documents as Fishing Craft, August 1955 and Comparisons

Section	August		Jan.-Aug.		Total
	1955	1954	1955	1954	1954
	(Number)				
New England	1	-	16	21	23
Middle Atlantic	2	-	11	13	15
Chesapeake	5	5	32	67	93
South Atlantic	7	6	47	83	119
Gulf	14	17	69	272	313
Pacific	15	12	101	88	117
Great Lakes	1	-	6	3	6
Alaska	5	2	30	22	27
Hawaii	-	-	2	1	1
Puerto Rico	-	-	-	-	2
Unknown	-	-	-	1	1
Total	50	42	314	571	717

Note: Vessels have been assigned to the various areas on the basis of registered home ports.

During the eight-month period ending with August 1955, a total of 314 vessels were documented for the first time as fishing craft, compared with 571 for the corresponding period of last year--a decrease of 45 percent.

American Samoa

TUNA CANNERY EXPANSION: The facilities of the tuna cannery at Pago Pago, American Samoa, and tuna fishing are to be expanded, reports the August 1955 Pacific Islands Monthly. This was the result of a visit from an official of the United States company operating the American Samoa cannery and tuna-fishing operation.

The ice-making and fish-storing capacity will be greatly expanded with the arrival of the Japanese freezer mothership Saipan Maru, which will also be able to store all swordfish, sharks, and shark-bitten tuna previously wasted for lack of storage. Except for a small quantity used on the local market, most of these will now go to Japan.

In the cannery three modern packing lines are being set up to replace the present two out-dated lines. New canning equipment is being installed, and the fish dock improved and extended. An additional fishing vessel, the Kaiko Maru No. 13, has arrived. She is somewhat larger than the others--352 gross tons. She landed 47 tons of fish as her first trip in June 1955.

* * * * *

JAPANESE FISHING OPERATION CATCHES LESS TUNA THAN PLANNED: The Japanese fishing company operating off American Samoa with the mothership Saipan Maru, completed early in September its first 3 months under a 6-months' contract to the tuna cannery located in that Island. During the first half of the scheduled operation there was difficulty in locating the fishing grounds because of unfamiliarity with the waters, and the catch of 2,895 metric tons was less than planned. However, recently the fishermen have at last learned the grounds and the catch has picked up to about 3.25 tons a day per vessel. There are thus some prospects that the plan will be fulfilled in the latter half of the operation, reports the September 5 issue of Nippon Suisan Shimbun.

Whether or not the contract will be renewed was scheduled to be decided in discussions to be held when the president of the United States firm operating the American Samoa tuna cannery visted Japan in September.

California

ALBACORE TUNA MAY MAKE ROUND TRIP ACROSS PACIFIC: The albacore tuna, which suddenly appears off the Southern California coast in mid-July and disappears again in September, may be making a round trip across the Pacific Ocean during the period it is gone from California shores.

This possibility came to light recently with the recovery off California of an albacore tagged by California's Department of Fish and Game in almost the same spot 11½ months before, according to an October 21 news release from that agency.

Previously four California-tagged albacore had been recovered by Japanese fishermen--two off Japan and two in mid-Pacific. One of these fish had been tagged at the same time and place as the one just recovered off California, and had been at sea six months--just half the time it took the California recovery to get back to the original tagging spot.

* * * * *

SARDINE, MACKEREL, AND ANCHOVY ABUNDANCE ASSESSED AND YELLOWTAIL TAGGED BY "YELLOWFIN" (Cruise 55-Y-7): This cruise of the California Department of Fish and Game's research vessel Yellowfin was made to assess the relative abundance of sardines, Pacific mackerel, jack mackerel, and anchovies in Northern Baja California waters, and to tag and release yellowtail. The coast of Baja California from Point San Eugenia to the California-Mexico border and the area around Cedros Island, Mexico, was surveyed. The Yellowfin departed from Los Angeles September 6 and returned September 25.

During the cruise 64 light stations were occupied and sets with the blanket net yielded 12 samples of sardines, 15 of Pacific mackerel, 2 of jack mackerel, and 8 of Northern anchovies. Of the 12 sardine samples taken, 8 contained fish of less than 125 mm. standard length (5¾ inch total length) and most probably spawned during the 1955 spawning season. These were found between Cedros Island and Cape

Colnett which includes the total range over which sardines of all sizes were taken. The smallest sardines collected (25 mm. standard length, 1 inch total length) were taken from the stomachs of Pacific mackerel at San Quintin Bay. Although nowhere very abundant, sardines were most frequently encountered in Sebastian Viscaino Bay and at Cedros Island. Throughout the area the sardine abundance was about the same as in 1954.

Pacific mackerel, the most abundant species in the area surveyed, were sampled from Sebastian Viscaino Bay in the south to Point San Miguel in the north. Out of the 15 Pacific mackerel samples, 12 contained young fish of either the 1954 or 1955 year-classes. Northern anchovies were taken throughout the range of the survey and the two samples of jack mackerel were taken at approximately the northern and southern limits of the cruise.

Yellowtail were encountered at only two stations and 37 hook-and-line fish were marked and released at West San Benito Island, and six troll-caught fish were marked and released around the southern part of Cedros Island. A juvenile yellowtail ($3\frac{1}{4}$-inch in length) was dipped from the bait tank during the course of fishing activities. Exact position of its capture is unknown but a check of baiting stations indicated it must have come from the southern area of Cedros Island.

Cruise 55-Y-7 of M/V Yellowfin.

The Yellowfin traveled a total of 546 miles scouting for fish schools--194 schools were observed, of which it was estimated that 15 contained sardines, 78 mackerel, 19 anchovies, 3 squid, 58 sauries, and 21 unknown species. Scouting and sampling were considerably hampered by strong winds and rough water between Point Canoas and San Quintin Bay, but weather conditions were favorable throughout the rest of the area surveyed.

Surface temperatures, bathythermograph casts, and reversing thermometer casts were taken at each station regardless of whether fish were observed or collected in the net. Surface temperatures throughout the cruise ranged from a minimum of 13.8° C. (56.8° F.) at Point Santo Tomas to a maximum of 24.1° C. (75.4° F.) at Lagoon Head, Sebastian Viscaino Bay. Sardines were sampled where surface temperatures ranged from 14.3° C. (57.7° F.) to 23.6° C. (74.5° F.).

* * * * *

LARGE NUMBER OF YELLOWTAIL TAGGED BY "STELLA MARIS" (Cruise 55-C-5): The commercial purse seiner Stella Maris tagged 10,005 yellowtail (Seriola dorsalis) during a 21-day cruise that ended September 27, 1955. The tagging operations were conducted in the vicinity of the St. Benito and Cedros Islands off the

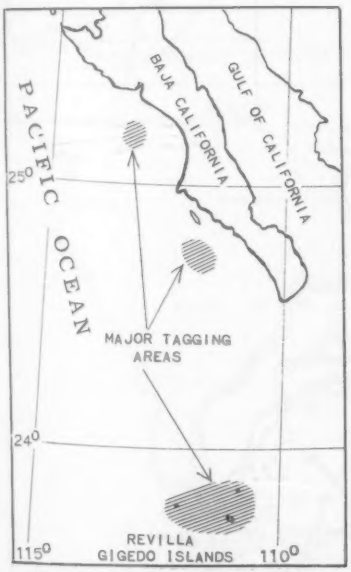
coast of Baja California. In addition to the yellowtail, 50 bluefin tuna (31.5 inches or more in length) were tagged. The Stella Maris was under charter to the California Department of Fish and Game.

The net was set 13 times with six of the hauls providing the fish for tagging. The total number of yellowtail tagged is almost twice as many as had been previously tagged. Twelve of the sets were made in the daytime but the one made at night was the most successful. Following the large set made at night, the scientists and crew of the vessel worked 20 hours to tag 5,730 fish. In a fine spirit of cooperation, the owners and crew of the purse seiner American Venture (fishing nearby) volunteered their services.

A number of the yellowtail were anesthetized in chlorobutanol solution before being tagged. These drugged fish were given an hour or more to recover in a separate section of the net before being turned loose. These fish were infinitely easier to handle and they appeared to be fully recovered when released.

Samples of 25 yellowtail each were saved from the tops of three hauls, before tagging operations started. The body cavities were injected with formalin and the fish were frozen whole to be brought back to the laboratory for later study.

* * * * *



Tuna-tagging Cruise 55-C-4 of the M/V Southern Pacific.

TUNA TAGGED OFF WEST COAST OF MEXICO BY "SOUTHERN PACIFIC" (Cruise 55-C-4): The capture and tagging of yellowfin, skipjack, and big-eyed tuna, the collection of specimens, and some limited hydrographic observations were accomplished by the commercial tuna clipper Southern Pacific on a 30-day cruise. The vessel, which operated in waters off Baja California and the Revilla Gigedo Islands, returned to San Diego on September 27. The tagging and collection of the data was performed by employees of the California Department of Fish and Game.

During the cruise a total of 642 yellowfin and skipjack tuna were tagged with type "G" tags and released by area and species as follows.

	Yellowfin	Skipjack	Total
Baja California . . .	383	165	548
Revilla Gigedo Islands	93	1	94
Totals	476	166	642

Due to rough seas only two night-light stations were possible. Most of the fish specimens collected were from bait-net hauls.

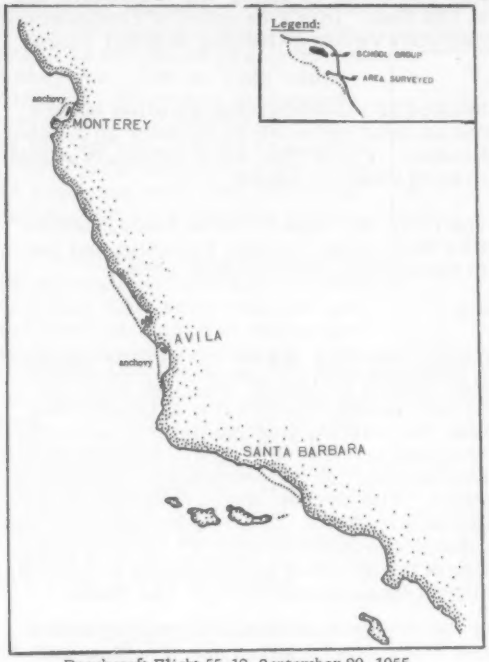
* * * * *

SURVEY OF SARDINE AND ANCHOVY SCHOOLS BY AIR CONTINUED (Airplane Spotting Flight 55-12): Aerial surveys were made by the California Department of Fish and Game plane of the inshore area between Santa Cruz in Central California to the Mexican border and the offshore area around Santa Catalina and Santa Cruz Islands. Flights of about four hours per day were made daily September 29-October 6, 1955. The purpose was to determine the distribution and abundance of the Pacific sardine and northern anchovy in California waters.

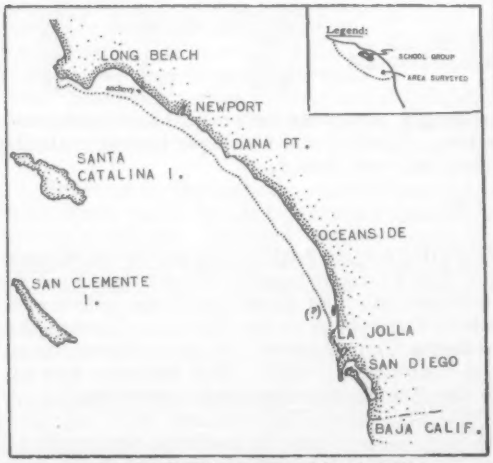
The aerial observations were hampered by coastal fog and on several days only a very limited area could be covered. In general, the abundance of anchovies

was less in Southern California during this survey than during the survey conducted in July 1955. Sardines were present in much greater numbers than in July and were distributed in two areas--in the area between Pt. Dume and Santa Barbara and in the the area between Newport and Oceanside.

Identification of schools observed was checked by interviewing commercial spotters and fishermen fishing in the areas covered by the survey. The following is a summary of the results of the survey by species.

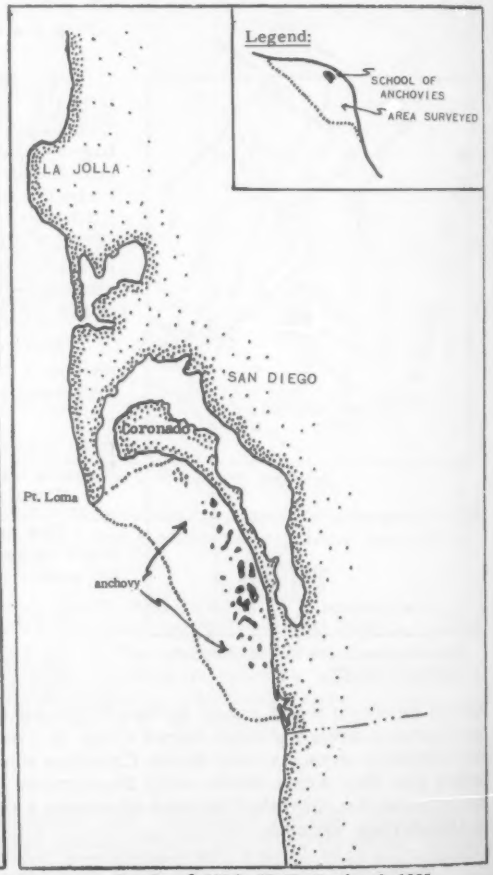


Beechcraft Flight 55-12, September 29, 1955.



Beechcraft Flight 55-12, October 1, 1955.

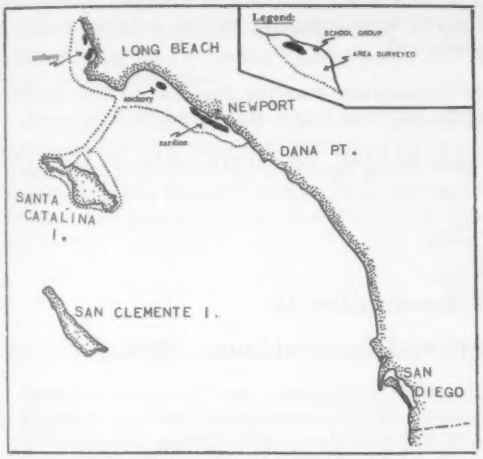
Anchovy: Six school groups of anchovies were located in the area surveyed. The school group in Monterey Bay extended from Santa Cruz to Seaside and and all schools were sighted within $\frac{3}{4}$ of a mile of the shoreline. Approximately 85 schools were sighted with the greatest concentration at the northern end of the bay near Capitola. Evidence obtained from bait and commercial fishermen indicated that most of the fish seen near



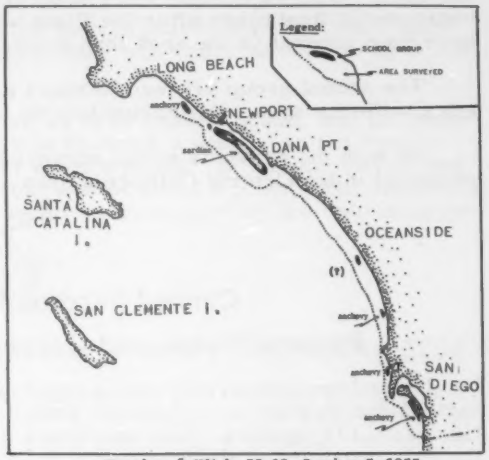
Beechcraft Flight 55-12, October 2, 1955.

Capitola were small 1955 year-class anchovies, whereas the schools near Fort Ord and Seaside were of larger 1954 year-class and older anchovies.

A small school group of anchovies was observed along the beach between Avila and Pismo Beach. Eight large schools were observed in this area.



Beechcraft Flight 55-12, October 4, 1955.



Beechcraft Flight 55-12, October 5, 1955.

Beechcraft Flight 55-12, October 6, 1955.

The school group off Port Hueneme and Ventura consisted of scattered schools and were fewer in numbers than during the previous flight in July, 1955. Foggy weather hampered accurate observation in this area.

The large mass of anchovies observed in Santa Monica Bay in July had apparently spread out or migrated from the area, as only a few very small schools of young anchovies were sighted in this area during this flight.

The large school group off Huntington Beach observed in July was still present, but in much smaller numbers. Anchovies were found northward from Newport toward the Long Beach breakwater and were also found to extend southward into the area occupied by a school group of sardines between Newport and Dana Pt.

The school group off Coronado strand was quite extensive and at least 48 large thin schools of 1955 year-class anchovies were present in this area.

Sardine: Three school groups of sardines were observed in California waters. The large school group of sardines in the channel between Santa Barbara and Santa

Cruz Island consisted partly of Pacific mackerel. The extent of this school group was not determined due to fog conditions and to lack of flying time and an adequate estimate of abundance could not be made.

The school group from Pt. Dume to Malibu was of scattered pure schools of sardines. Only 12 schools were observed in this area, but since catches by the commercial fleet made after the flight were of large tonnage, more schools must have been present in the area than were observed.

The school group between Newport and Oceanside was the largest in the southern California area. Approximately 65 large schools were observed in this area.

As with the previous aerial surveys made in 1955, no sardine schools were observed in the Central California area.

Canned Sardine Consumption in Federal Penal and Correctional Institutions, 1954

Canned sardines in 1954 were served in 13 out of 27 Federal penal and correctional institutions located throughout the United States, with a combined average population of 21,175 persons. The non-users were the smaller institutions, accounting for only one-third of the population interned in the institutions, according to a survey made by the U. S. Fish and Wildlife Service from data supplied by the Federal Bureau of Persons.

Relatively few institutions in the South reported serving canned sardines while all the institutions in the Northeast and West served this product.

Canned Sardine Consumption in 27 Federal Penal and Correctional Institutions, 1954

Area and State	Non-Users		Users						
	No. of Inst.	Avg. Pop. of Inst.	No. of Inst.	Avg. Pop. of Inst.	Annual Consumption	Per Capita Consumption	Description of Can Used: Can Size	Description of Can Used: Cost Per Pound	Description of Can Used: Kind of Pack
					(Pounds)			¢	
NORTHEAST	-	-	3	2,000	1/	1/	-	-	-
Connecticut	-	-	1	500	N.R.	N.R.	N.R.	N.R.	N.R.
New York	-	-	1	200	150	0.75	N.R.	N.R.	N.R.
Pennsylvania	-	-	1	1,300	N.R.	N.R.	N.R.	N.R.	N.R.
NORTH CENTRAL	2	1,975	3	5,025	8,754	1.74	-	-	-
Ohio	-	-	1	1,250	2,356	1.88	1 lb.	24	Tomato pack
Michigan	1	650	-	-	-	-	-	-	-
Indiana	1	1,325	-	-	-	-	-	-	-
Missouri	-	-	1	1,100	1,117	1.02	3¼ oz.	35	In oil
Kansas	-	-	1	2,675	5,281	1.97	3¼ oz.	39	In oil
SOUTH	9	4,090	4	4,890	1/	1/	-	-	-
Washington, D.C.	1	450	-	-	-	-	-	-	-
West Virginia	2	890	-	-	-	-	-	-	-
Virginia	2	875	-	-	-	-	-	-	-
Georgia	-	-	1	2,600	5,535	2.13	N.R.	N.R.	N.R.
Florida	1	600	-	-	-	-	-	-	-
Kentucky	1	525	-	-	-	-	-	-	-
Alabama	1	240	-	-	-	-	-	-	-
Oklahoma	-	-	1	1,100	N.R.	-	1 lb.	30	N.R.
Texas	1	500	2	1,190	415	.35	3¼ oz. & 1 lb.	2/22	N.R.
WEST	2	775	4	2,420	1/	1/	-	-	-
Colorado	-	-	1	400	N.R.	-	1 lb.	23	N.R.
Arizona	1	275	1	300	1,100	3.67	N.R.	34	N.R.
Washington	-	-	1	1,400	1,400	1.00	1 lb.	17	N.R.
California	1	500	1	320	192	0.60	1 lb.	17	N.R.
Total	13	6,840	14	14,335	1/	1/	-	-	-

1/ Data not available. 2/ One of the institutions did not specify cost for the 3¼ ounce can. N.R. - Not reported.

The average annual consumption of canned sardines for 9 of the institutions reporting was 1.59 pounds per inmate.

Of the institutions reporting, canned sardine consumption was highest in Arizona, 3.67 pounds per inmate.

Of those institutions reporting on the size of can purchased 5 of the 8 purchased one-pound cans, 2 purchased $3\frac{1}{4}$-ounce cans, and 1 purchased, both $3\frac{1}{4}$-ounce and one-pound cans.

The cost of canned sardines ranged from 17 to 39 cents a pound, and the average cost for the nine institutions reporting was 32 cents a pound. In the Pacific Coast institutions, the average price was 17 cents a pound. In the institutions not located on the Pacific Coast, the average cost was 34 cents a pound. The difference in price is probably due to the variety of canned sardines used by the individual institution.

Cans--Shipments for Fishery Products, January-September 1955

Total shipments of metal cans for fish and sea food during January-September 1955 amounted to 74,851 short tons of steel (based on the amount of steel consumed in the manufacture of cans), compared to 80,651 short tons for the same period last year.

The packs of canned tuna and Maine sardines continue to be below normal.

Note: Statistics cover all commercial and captive plants known to be producing metal cans. Reported in base boxes of steel consumed in the manufacture of cans, the data for fishery products are converted to tons of steel by using the factor: 23.0 base boxes of steel equal one short ton of steel.

Federal Purchases of Fishery Products

FRESH AND FROZEN FISHERY PRODUCTS PURCHASED BY THE DEPARTMENT OF DEFENSE, AUGUST 1955: For the use of the U. S. Army, Navy, Marine Corp, and Air Force, the Army Quartermaster Corps during August 1955 purchased 2.3 million pounds (valued at $1.0 million) of fresh and frozen fishery products (see table). This was an increase of 14.8 percent in quantity and 26.6 percent in value as compared to July purchases. August 1955 purchases were higher by 3.9 percent in quantity and 5.3 percent in value than the purchases for August 1954.

Purchases of Fresh and Frozen Fishery Products by Department of Defense (August and the First Eight Months of 1955 and 1954)

QUANTITY				VALUE			
August		Jan.-Aug.		August		Jan.-Aug.	
1955	1954	1955	1954	1955	1954	1955	1954
(Millions of Pounds)				(Millions of Dollars)			
2.3	2.2	17.5	16.1	1.0	1.0	7.5	6.7

Purchases of fresh and frozen fish for the first eight months in 1955 totaled 17.5 million pounds (value $7.5 million)--higher by 8.2 percent in quantity and 11.0 percent in value as compared with the first eight months of 1954.

Prices paid for these fishery products by the Department of Defense in August 1955 averaged 44.3 cents per pound as compared with 40.2 cents in July and 43.8 cents in August 1954.

In addition to the purchases of fishery products indicated above, the Armed Forces generally make some local purchases which are not included in the table on the preceding page.

Fish Sticks Leading Frozen Specialty Handled by Major Wholesalers

Fish sticks were reported as being handled in 1955 by over 98 percent of the major wholesale distributors surveyed, according to the trade publication Quick Frozen Foods. Only 92 percent of the same distributors reported handling fish sticks in 1954. French-fried potatoes, which were the leading specialty in 1954, dropped to second place in 1955 and were handled by 95 percent of the distributors.

Breaded shrimp was sold by 91 percent of these outlets in 1955, a small decline from 94 percent in 1954.

Precooked seafoods rose in popularity. Stocked by 65 percent of the distributors in 1954, the survey indicates they were handled by nearly 85 percent in 1955.

Distributors were asked which specialties in frozen-food items were their "best sellers." French fries and pot pies were the number one and two "best sellers" with fish sticks and breaded shrimp in third and fourth place. Fish sticks were reported as being the number one best seller by 19 percent of the dealers; 22 percent reported them as the second best seller; and 36 percent reported them in third place. Breaded shrimp was reported by 7 percent of the distributors as the number one best seller.

Competition is becoming keener in the specialty frozen-food field. The distributors reported that their average mark-up had declined during the past two years from 19 percent to around 17 percent.

Fur-Seal Skin Prices Up Slightly at Fall Auction

Government-owned fur-seal skins registered a small advance (averaging 3.4 percent) at the semiannual fur auction held in St. Louis, Mo., on October 10, the Secretary of the Interior announced on October 12.

The sale was well attended by both United States and Canadian buyers. Bidding was rapid and orderly.

The grand average for all skins sold for the account of the United States Government was $94.14. At the April 1955 sale the grand average was $92.81.

A total of 24,610 skins, products of the sealing industry administered by the Department's Fish and Wildlife Service on the Pribilof Islands of Alaska, brought $2,316,735. This compares with 24,746 skins sold for $2,296,757 at the April auction, and 26,590 skins sold for $2,045,326 at the October 1954 auction.

Of the Alaska skins, 15,152 were dyed "Matara" brown, 1,528 were "Safari" brown (a lighter brown), and 7,930 were black. The Matara-processed skins averaged $91.89, an increase of 4.6 percent above the April auction. The Safari skins sold for an average of $68.01, up 6.5 percent. The black skins averaged $103.46, up 1.1 percent.

A total of 1,330 Matara- and Safari-processed skins, representing part of the United States share of skins taken off the Japanese coast in 1952 as part of an international research program, averaged $46.52, for a total of $61,868.

In addition to the United States skins, 4,325 Cape of Good Hope fur-seal skins were sold for the South African Government at an average of $32.98, up 8.4 percent. A total of 680 Uruguay fur-seal skins were sold for the Uruguayan Government at an average of $44.30.

The tentative date for the next auction is April 16, 1956. At that time the quantities to be offered are expected to be slightly in excess of offerings at this fall auction.

Great Lakes Fishery Investigations

SURVEY OF NORTHERN LAKE MICHIGAN CONTINUED BY "CISCO" (Cruise IX): The ninth in a series of cruises to study the fishery and limnological conditions of northern Lake Michigan was made by the Service's Great Lakes Fishery Investigations research vessel Cisco between September 21 and October 2, 1955.

During the cruise nylon gill nets of graded mesh sizes were set at 4 depths (25, 50, 80, and 135 fathoms) off Frankfort and two depths (25 and 50 fathoms) off Sturgeon Bay. Bloaters (Leucichthys hoyi) dominated all catches. The kiyi (L. kiyi) was taken in larger numbers than previously encountered this year. The increased catch of kiyi in gill nets is related to increased activity prior to spawning as most individuals were in ripe or near-ripe condition, but none had spawned.

One gang each of 1-inch and 2-inch nylon gill nets were set obliquely from top to bottom in 160 feet of water off Frankfort. Bloaters were common at all depths in both meshes but were most abundant at depths greater than 40 feet. Small bloaters taken in the 1-inch mesh were most abundant at mid-depths, 40-100 feet, while larger bloaters taken in the 2-inch mesh were most abundant between the 140-foot depths and the bottom. Lake herring (L. artedi) were taken in the upper 100 feet and yellow perch (Perca flavescens) in the top 80 feet of water. Smelt (Osmerus mordax) were most abundant between 60 and 80 feet but a few were taken between 20 and 60 feet from the surface. Fathometer tracings in this area where this net was set showed a daytime concentration of fish at mid-depth (probably mostly small bloaters and smelt) and near the bottom (mostly large bloaters). At dusk the fish moved off the bottom and distributed themselves evenly between the mid-depth concentration and the bottom. As darkness approached, these fish moved to the area between the surface and the thermocline where they remained for about an hour, after which nearly all fish became concentrated at mid-depth. There was no hypolimnion at this location. The thermocline extended from mid-depth to the bottom.

Drags were made at several depths between 15 and 50 fathoms off Frankfort and between Sturgeon Bay and Manitowoc. Chub catches were light in shallow water and moderate in deeper water. Small chubs retained by a small mesh (1.5-inch stretched measure) outer covering over the regular trawl cod end were abundant on the bottom in shallow water but not in deep water. Small chubs taken in the oblique sets of gill nets were at about the same depth over deep water as those taken by the trawls on the bottom near shore.

An intensive day and night plankton study was made in 25 fathoms of water off Frankfort. Mysis relicta came to the surface after dark in spite of a bright full moon. Pontoporiea hoyi, which had been fairly abundant in previous night plankton samples in this area, were nearly absent during this study and only one was taken near the surface where they are usually abundant after dark.

Hydrographic transects were made between Frankfort and Sturgeon Bay and between Manitowoc and Ludington. Routine physical-chemical data were collected and drift bottles were released at 5-mile intervals along each transect. The surface temperature ranged from 10.5° C. (50.9° F.) to 17.5° C. (63.5° F.). Thermal stratification is still present but the thermocline is steadily becoming deeper and thicker. There has been a 50-percent return of drift bottles released so far this year and returns are continuing at a steady rate despite lateness in the season.

Maine

SARDINE PACK AS OF OCTOBER 15: The total pack of canned Maine sardines as of October 15 for the current season was 1,087,932 cases (100 ¼ drawn cans of 3¼ oz.), see graph on Chart 6 in this issue.

Fishing was still spotty and was expected to remain so until the season closure on December 1 because late fall weather is very unpredictable, reports the Maine Sardine Industry.

Marketing Situation for Edible Fishery Products, Winter 1955/56

United States civilian consumption of fishery products during the next 6 months is expected to be at a little lower rate per person than a year earlier. Although average consumption of the fresh and frozen commodities is expected to total close to that in the same period of 1954/55, some decline is in prospect for the canned products. Retail prices of fishery products will likely average a little higher during coming months than a year earlier, in part because of higher prices for fresh and frozen shrimp and canned fishery products.

Commercial landings of fish for sale in the fresh or frozen forms will be declining seasonally from now through late winter. However, total supplies during the period probably will be about as large as a year earlier. Stocks of frozen fish and shellfish in the United States and Alaska on October 1 totaled 191.5 million pounds--5.3 percent smaller than a year earlier, but imports are expected to continue high.

Supplies of canned fishery products during the remainder of the 1955/56 marketing year--until about next July--will be lower than a year earlier because of the smaller packs of important items in 1955. The output of canned salmon was much lower than in 1954 and the smallest in the past 30 years or more, and that of Maine sardines was down considerably, While the pack of tuna will be large in 1955, it will not equal the record volume reached last year. Canned mackerel production probably will be slightly larger than in 1954. Domestic supplies of canned fishery products during the present marketing year will be supplemented to some extent by imports.

Of the canned fishery products consumed by United States civilians in recent years, salmon and tuna together have accounted for 60 to 70 percent of the total. The smaller pack of canned salmon in 1955 points to a decline in civilian consumption of this product, with the reduction likely to be more apparent in 1956 than in 1955. Canned salmon consumption has been shading downward since 1949 when it matched the 1947 postwar peak rate of 1.5 pounds per person. In 1954, it was 1.3

pounds. For canned tuna, on the other hand, supplies may not equal those of a year earlier, but they will be sufficiently large to maintain the long-time upward trend in consumption. In 1954 civilians consumed about 1.7 pounds of canned tuna per person, the highest rate on record.

Imports of major fishery products during the next few months are expected to continue high, relatively close to that of a year earlier. Receipts of fresh and frozen products from abroad may be no higher, and some decrease for the canned commodities is in prospect. Exports during the same period may be lower than in the same period of 1954/55 primarily because of smaller supplies of those types of canned fishery products which are in demand in our foreign markets.

This analysis appeared in a report prepared by the Agriculture Marketing Service, U. S. Department of Agriculture, in cooperation with the U. S. Fish and Wildlife Service, and published in the former agency's November 7, 1955, release of The National Food Situation (NFS-74).

National Tuna Week Supported by Interior Secretary

Support of National Tuna Week, November 3-12, 1955, was announced by Secretary of the Interior Douglas McKay early in November. This tuna industry promotion is a preholiday move to urge consumers to give special attention to one of America's favorite fish foods before and during Thanksgiving, Christmas, and New Year's festivities.

Tuna is especially recommended for winter diet both from its nutritional value and from the ease with which it is converted to a main dish or an appetizing snack. It is particularly recommended as one of the "on hand" foods which can be used on any occasion.

Tuna is available in many packs, regular and "dietetic." The "dietetic" tuna is salt-free and without the usual added oil for those who must omit these from their food. Tuna is available in solid, chunk, grated, and flaked style. Practically all of the packs are available in white, or light meat. There are also speciality packs such as tuna in olive oil, tuna paste, tuna baby food, and tuna and noodles.

The tuna industry is one of the most important of the Nation's fisheries. The product has been a family standby in this country for many years.

The U. S. Fish and Wildlife Service aided national tuna week with special promotional efforts with schools, food trade groups and institutions, as well as attracting general consumer attention.

Fish and Wildlife Service test kitchens at College Park, Md., and Seattle, Wash., have been conducting demonstrations on fish cookery and have developed many new recipes for the use of various fish products, including tuna.

North Atlantic Fisheries Exploration and Gear Research

NYLON AND COTTON COD ENDS TESTED BY "DELAWARE" (Cruise 11) AND "ALBATROSS III" (Cruise 68): An operation unusual in fisheries research was completed on November 5, with the return to port of the Service's research vessel Albatross III and the exploratory fishing vessel Delaware. The two vessels completed

90 bottom drags, with a standard No. 41 otter trawl, in the Georges Bank area. Tows were made at identical speeds, with the vessels as close together as practical.

The purpose of this joint cruise was to determine the escapement sizes of haddock through trawl cod ends made of nylon and cotton twine, and to determine the effects of use on the mesh measurements of these same cod ends. In addition to the primary purpose of the cruise, a comparison of various methods of measuring escapement of haddock through trawl-net cod ends was made.

The two vessels were operated as follows: (1) the first 14 tows were simultaneously made with identical gear and nets, to establish the comparative fishing power of each vessel; (2) the remaining tows were made simultaneously with various sized cod ends of nylon and cotton, to determine:

(a) the selectivity of the various sized cod ends,

(b) the after-use measurements of various sized cod ends, and

(c) the comparative fishing efficiency of cod ends of various sizes.

In general, haddock were found to be scarce throughout the cruise with catches seldom exceeding 2,000 pounds per tow. However, sufficient haddock of medium sizes were taken for successful determination of escapement through medium-size meshes. The study of the effect of heavy loads of fish on cod-end mesh sizes was limited to results obtained from light catches.

North Atlantic Herring Research

SAMPLES OF LARGE HERRING COLLECTED BY "THEODORE N. GILL" (Cruise 6a): The principal objective of this cruise by the research vessel Theodore N. Gill was to collect samples of herring on the spawning grounds. Large spawning herring have been extremely scarce this fall along the northeastern coast of the United States. Only two samples had been obtained since August and both of these were from draggers operating on offshore banks. Few large herring have been reported on their usual spawning grounds near Grand Manan, Mount Desert Rock, Matinicus, Monhegan, and Damariscove. A few scattered schools had been seen by purse seiners at Boone Island and Isles of Shoals.

Gill nets were set around the Isles of Shoals for seven nights and a sample of large mature herring was caught. Purse seiners were also active around the islands, but were unable to locate any schools large enough to set on. There were a few fish with running eggs and milt; most of the herring had spawned within a short period previously.

The gill nets were set one night at Damariscove Island and two nights in the Matinicus group. The only herring catch of these three sets was $\frac{3}{4}$ bushel taken at the southeastern side of Ragged Island, in the Matinicus group.

The vessel started the cruise from Boothbay Harbor, Me., on October 3, 1955.

* * * * *

SAMPLES OF SPAWNING HERRING TAKEN BY "THEODORE N. GILL" (Cruise 7): The principal objective of this cruise (October 19-28, 1955) by the Service's research vessel Theodore N. Gill, was to obtain gill-net samples of spawning herring for use in the study of racial characteristics.

Anchor gill nets were set on the bottom near Matinicus Island on the nights of October 19 and 20. Several bushels of herring were caught in these sets, some of which were in spawning condition with milt and roe running. Small quantities of blueback herring, pollock, cod, hake, and dogfish were also taken. Reports indicated that spawning fish were present near the Whistle Buoy on Seguin SSW. Shoals. On the afternoon of October 21 the vessel proceeded to that area where sets were made that evening. A small quantity of large herring just starting to spawn was caught during this set.

Other sets were made in this vicinity on October 22, 23, 26, and 27, and yielded only a very few herring. Winds of 30-40 miles per hour prevented lifting the nets set on October 23 until October 26.

Some whiting, dogfish, hake, alewives, and blueback herring were taken in this vicinity. Many of the fish brought up in this area had been eaten by isopods, small crustaceans related to the terrestrial "sow bug."

Bathythermograph casts and plankton tows were made at each set and when running between the locations fished.

Northeast Pacific Fish Distribution Studied

Carrying out part of the Fish and Wildlife Service's assignments under the International North Pacific Fisheries Commission, the chartered vessels Mitkof and and Paragon during August and September 1955 studied the presence and seasonal distribution of salmon, albacore, tuna, pomfret, herring, and other species on the high seas and in the Gulf of Alaska.

These vessels fished south of the Aleutians between 165° W. longitude and 175° E. longitude. The vessel station pattern extended north from 45° N. in an attempt to run beyond the salmon range. Salmon were found at stations above but not below 48°. Albacore tuna were found south of 48°. This finding meant the discovery of the southern limit of the ocean range of the Pacific salmon and increased knowledge on the northern range of albacore. The catches also showed that salmon and steelhead trout are found along the northern fringe of the "Japanese Current."

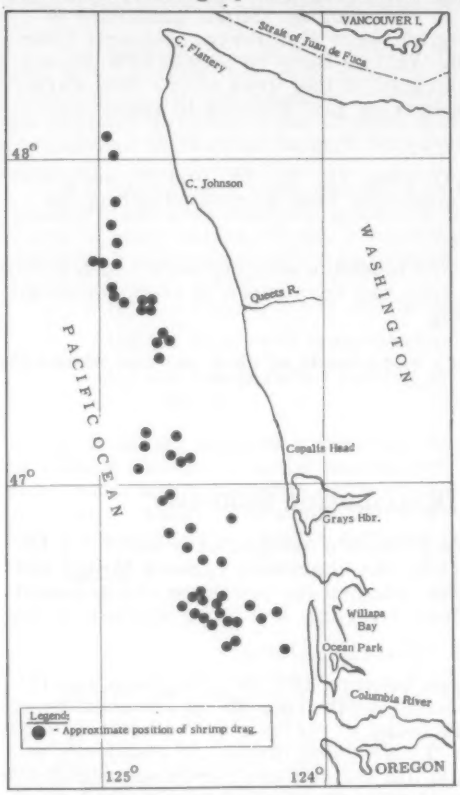
Fishing at points shoreward, to define salmon distribution immediately along the coast, revealed salmon in a band immediately adjacent to the coast and albacore only in the warmer offshore waters.

The vessel catches indicated a random distribution of five species of salmon and steelhead trout throughout the area for the summer months.

North Pacific Exploratory Fishery Program

SURVEY OF SHRIMP RESOURCES OFF COAST OF WASHINGTON BY "JOHN N. COBB" (Cruise 24): Small pink shrimp (115-164 head-on to pound), commonly referred to as "cocktail" shrimp, were caught off the Washington Coast from Ocean Park to Cape Johnson by the Service's exploratory fishing vessel John N. Cobb. The four-week cruise for shrimp (which ended November 10, 1955) was carried out in cooperation with the Washington Department of Fisheries.

A total of 52 drags were made at depths of 21 to 116 fathoms, 45 with a 20-foot beam trawl having $1\frac{1}{4}$-inch stretched-mesh netting, and 7 with a small West Coast box-type otter trawl having a $1\frac{1}{4}$-inch stretched-mesh cod end.



M/V John N. Cobb Cruise 24, Oct.-Nov. 1955.

The best catches of shrimp (per one-hour drag) with the beam trawl were made off Grays Harbor where 5 drags at 49 to 71 fathoms caught from 75 to 140 pounds of pink shrimp per drag, and off the Queets River where 5 drags at 57 to 88 fathoms caught from 80 to 150 pounds per drag. Off Willapa Bay 15 drags at 34 to 116 fathoms caught from 14 to 130 pounds of pink shrimp per drag. Side-stripe shrimp were taken in insignificant quantities in several of the deeper drags.

Drags with the otter trawl off Copalis Head at 48 to 80 fathoms caught from 240 to 600 pounds of pink shrimp per one-hour drag. The main purpose of using the otter trawl was to compare its effectiveness with that of the beam trawl. While the otter trawl proved to be more efficient than the beam trawl in taking shrimp, catches with this gear also contained considerable quantities of bottom fish which were difficult to separate from the shrimp. Catches with the beam trawl generally contained only small quantities of bottom fish along with the shrimp.

In general most of the bottom dragged was composed of a mixture of green mud and sand. Favorable dragging bottom was found in most portions of the area; however, one drag resulted in a broken beam and another drag resulted in a torn otter trawl.

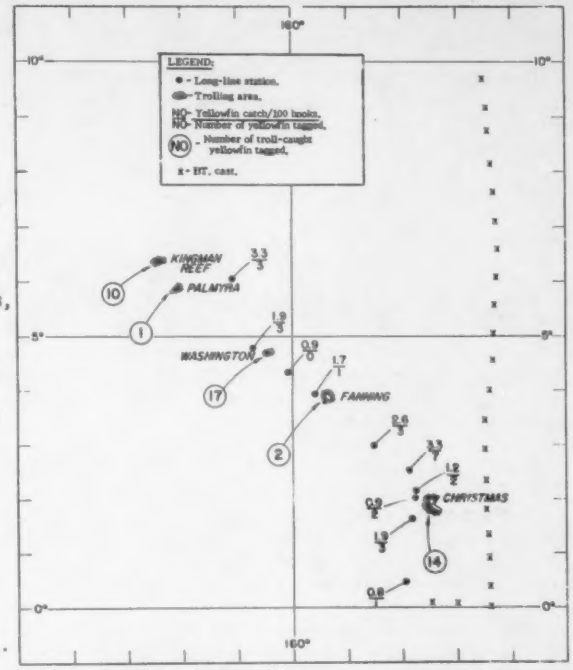
Samples of shrimp from all localities were collected and frozen by biologists from the State of Washington Department of Fisheries' shellfish division for biological study.

Considerable fishing time was lost during the cruise because of adverse weather conditions.

There has been considerable industry interest in potential shrimp grounds off the Washington coast in recent years. Successful explorations by the State of California in 1950 and 1951 resulted in the establishment of a commercial shrimp fishery off northern California. The State of Oregon also carried out encouraging shrimp explorations off the Oregon coast in 1951 and 1952.

Pacific Oceanic Fishery Investigations

CHARTERED VESSEL "COMMONWEALTH" COMPLETES LINE ISLANDS YELLOWFIN FISHING EXPERIMENTS (Cruise 5): Intensive trolling around the islands of Christmas, Washington, Fanning, and Palmyra and 10 days of long-line fishing in offshore waters showed tuna abundance to be at a comparatively low level, according to the Fishery Research Biologist in charge of scientific work aboard the Commonwealth. The best day's long-line fishing produced a catch rate of 3.27 yellowfin tuna per 100 hooks fished, which is only about half the rate normally obtained in the area. As usual, the tuna taken on the long lines were much larger than those caught by trolling close to the reefs, averaging around 150 pounds as compared with about 40 pounds for the trolled fish. A total of 25 long line-caught yellowfin and 44 troll-caught fish were tagged and released alive for study of their growth and migrations.



M/V Commonwealth--Cruise No. 5, September 9-October 15, 1955. Forty baskets of 11-hook gear fished at the 10 long-line stations indicated above. Yielded 78 yellowfin, 4 skipjack, and 1 big-eyed tuna.

The Commonwealth, a 110-foot chartered commercial fishing vessel returned to Honolulu on October 15, from a cruise of slightly more than one month's duration around the Line Islands about 1,000 miles south of Hawaii. The vessel was chartered for a program of continuous observations on the seasonal fluctuations in yellowfin tuna abundance in the equatorial fishing grounds of the central Pacific. This was the last cruise under the charter; further surveys will be made from government vessels.

A new system for handling long lines was tested on the cruise and showed considerable promise. The conventional method requires that the long-line gear be disassembled as it is brought in and reassembled when it is set. On the Commonwealth the main line was coiled down continuously in a large tub, the branch lines being removed as they came on board. Though it is not anticipated that the new system will greatly increase the over-all speed of the operation, it appears that it will reduce the number of deckhands required, thus helping to make this method of fishing economical.

The scientists aboard the Commonwealth installed a temperature-recording device actuated by clockwork on the sea bottom off Christmas Island. It will record changes in the water temperature over a 6-months period without servicing. The data recorded by this device will be studied for indications of shifts in currents and water masses that relate to the fluctuations in the abundance of tuna.

* * * * *

PROGRESS MADE IN DEVELOPING ELECTROFISHING FOR TUNA: Significant progress has been reported by scientists of the University of Hawaii in the development of electrofishing for tuna. This research work is being conducted under contract with the Service's Pacific Oceanic Fishery Investigations.

Experiments by the Physics Department of the University show that the movements of 8- to 10-pound yellowfin tuna can be controlled in a large well-grounded tank. The tank used measured 35 feet long, 4 feet deep, and 11 feet wide. By using 16-foot electrode spacing, it was possible to force the tuna to swim to the positive electrode when direct current interrupted at the rate of 20 cycles per second was applied. The source of power was in 6-volt storage batteries that energized a bank of condensers.

South Pacific Fishery Investigations

PROGRESS MADE IN ESTIMATING PACIFIC SARDINE POPULATION: One of the fundamental problems in investigating the Pacific sardine is determining the number of fish in the population along the west coast of the United States and Baja California. Each year independent estimates are made by various methods and then compared. One such estimate is derived from a census of the total number of sardine eggs spawned each year.

A current study by the South Pacific Fishery Investigations of the U. S. Fish and Wildlife Service on sardine fecundity specifies three questions that must be answered to determine the number of fish in a spawning population: (1) How many eggs does each female produce per batch on the average? (2) How many batches of eggs does each female produce, on the average, during a season? (3) What is the ratio of males to females in the population?

The number of eggs spawned per batch has been determined for females of various sizes and ages and the sex ratio of the population is estimated each year by routine sampling methods, but the number of batches of eggs spawned by each female is unknown. Although it is a relatively simple matter to examine a fish and count the eggs present at any given time, the difficulty arises in not knowing how many times such a fish develops and spawns a batch of eggs during a season.

For the past several years sardine population estimates based on the total number of eggs spawned per year have been derived on the assumption that each female spawns three times a season, producing a total of 100,000 eggs. In reviewing all the evidence on this point, however, it may be concluded that the number of batches spawned per year is still a moot question. It is a difficult problem to solve for most egg-laying marine fishes and no method has been devised that will yield conclusive results.

Population estimates based on the total number of eggs spawned per year are further complicated by the fact that the number of eggs present in the ovaries increase with age, or more precisely, with the weight of the fish and also by the fact that some unknown portion of the younger fish is not sexually mature. Current work shows the number of eggs per batch in the ovary varies from approximately 8,000 for the smaller females to 50,000 for the larger females. This relationship can be expressed in an equation from which the total weight of spawning females can be calculated, once the total number of eggs in the sea is known.

The present study also describes incipient egg development in a third of the one-year-old and in over three quarters of the two-year-old sardines, whereas it has been assumed in the past that only a half of the two-year-old fish are sexually

mature. It is clear that more extensive study is needed to estimate accurately the portion of one-year-old and two-year-old fish that spawn each year.

The number of batches spawned per female and the portion of younger fish that spawn can best be estimated from the examination of great numbers of fish captured at regular intervals throughout the year. Such an analysis is planned for the future. Past and future population estimates based on the number of eggs in the sea will be confirmed or modified as information accrues from studying egg production and spawning in the female sardine.

Freight Rate Increase of 1952 Made Permanent

The International Commerce Commission has removed the expiration date for the last 15 percent rate increase granted the railroads in Ex Parte 175. This rate increase, granted in and effective since 1952, will now become a permanent part of the rate structure. No reasons were given by the Commission for this action but a formal opinion will be issued later.

Saltonstall-Kennedy Act Fisheries Projects

FISHERY STATISTICAL OFFICE OPENED IN MORGAN CITY: A statistical office for the collection of fishery data has been opened at Morgan City, La., by the Branch of Commercial Fisheries, U. S. Fish and Wildlife Service. That office will collect detailed data on employment in the fisheries, number of craft and quantity of gear operated, the catch of fishery products, and related information on the fisheries in the vicinity of Morgan City. Detailed statistics on the shrimp fishery will be obtained in connection with the Service's expanded program for the collection of shrimp statistics. Dunbar P. Delaune will be in charge of the office.

This project is being financed by funds provided by the Saltonstall-Kennedy Act (68th Stat. 376).

U. S. Foreign Trade

IMPORTS AND EXPORTS OF SELECTED FISHERY PRODUCTS, JANUARY-AUGUST 1955: Among the trends observed in United States imports of fishery products during the first eight months of 1955 was the increase in imports of frozen tuna and canned crab meat and the declines in canned salmon, fish meal, and groundfish fillets (see chart 7, p. 81 of this issue.)

Imports of groundfish and ocean perch fillets from Iceland dropped sharply in recent months, according to data compiled by the U. S. Fish and Wildlife Service from reports of the Bureau of the Census. In the first eight months of 1955, these imports from Iceland totaled 13.7 million pounds as compared with 30.2 million pounds in the similar period of the previous year. Imports of these items from Canada showed a gain of 12.2 million pounds.

Increased quantities of frozen tuna--18.8 million pounds more than in the 1954 period--came largely from Japan and Peru. Fish meal imports were substantially below those of the previous year due principally to smaller receipts from Norway, Angola, and Peru. Canned salmon imports, largely from Canada, were 83 percent below those of the period of a year earlier. Canned crab meat imports, principally from Japan, were considerably above a year ago.

Among the January-August 1955 exports, canned sardines and canned salmon showed large gains over the eight months of 1954. Fish oil exports this year, however, were about 24 percent less than a year ago.

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United States Foreign Trade in Edible Fishery Products, July 1955 and Comparison

Item	Quantity			Value		
	July		Year	July		Year
	1955	1954	1954	1955	1954	1954
	(Millions of Lbs.)			(Millions of $)		
Imports:						
Fish & shellfish: fresh, frozen, & processed 1/	73.5	82.5	801.7	18.6	17.9	202.8
Exports:						
Fish & shellfish: processed 1/ only (excluding fresh and frozen)	4.8	3.3	50.8	1.2	0.8	13.2

1/ Includes pastes, sauces, clam chowder and juice, and other specialties.

EDIBLE FISHERY PRODUCTS, JULY 1955: United States imports of fresh, frozen, and processed edible fish and shellfish in July 1955 amounted to 73.5 million pounds (valued at $18.6 million), according to a Department of Commerce summary tabulation (see table). This was an increase of 20 percent in quantity and 2 percent in value as compared with June imports of 61.5 million pounds (valued at $18.2 million). Compared with a year earlier, July 1955 imports were down 10 percent in quantity, but increased 4 percent in value.

Exports of processed edible fish and shellfish (excluding fresh and frozen) in July totaled 4.8 million pounds (valued at $1.2 million)--an increase of 33 percent both in quantity and value as compared with June exports of 3.6 million pounds (valued at $0.9 million). July exports were higher by 45 percent in quality and 50 percent in value as compared with a year earlier.

U. S. Fish-Stick Production

JANUARY-SEPTEMBER 1955: In the third quarter 1955 fish-stick production was 18 percent and 13 percent less than that of the first and second quarters, respectively (see table).

U. S. Fish-Stick Production, January-September 1955

Month	Cooked		Uncooked		Total	
	1955	1954	1955	1954	1955	1954
January	4.4	2.4	.7	.4	5.1	2.8
February	4.9	2.9	.9	.3	5.8	3.2
March	6.2	3.6	.9	.4	7.1	4.0
April	5.6	3.4	.7	.4	6.3	3.8
May	4.7	3.5	.5	.4	5.2	3.9
June	5.0	4.1	.6	.3	5.6	4.4
July	4.1	3.5	.5	.4	4.6	3.9
August	4.3	4.0	.4	.4	4.7	4.4
September	5.1	3.8	.5	.5	5.6	4.3
Total for 9 months.	44.3	31.2	5.7	3.5	50.0	34.7

During the first nine months of 1955, a total of 50.0 million pounds of fish sticks were produced. This production consisted of 44.3 million pounds of cooked and 5.7 million pounds of uncooked sticks. During the same period of 1954, a total of 34.7 million pounds

of fish sticks consisting of 31.2 million pounds of cooked and 3.5 million pounds of uncooked sticks were packed. The total production amounted to 50.1 million pounds in 1954 and 7.5 million pounds in 1953.

Wholesale Prices, September 1955

In spite of labor-management disputes in some areas, good weather increased the landings in September and caused a sharp drop in prices in some instances. The over-all index of edible fish and shellfish (fresh, frozen, and canned) in September 1955 was 109.2 percent of the 1947-49 average (see table)--2.2 percent lower than in August and 4.1 percent below September 1954.

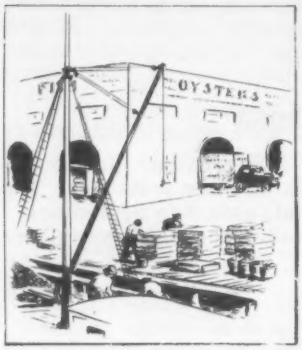
Higher prices for all items included in the drawn, dressed, or whole finfish subgroup index were more than offset by the substantial drop in ex-vessel prices for large drawn haddock at Boston from August to September because of heavier landings and a light demand. The September 1955 prices for both fresh halibut and

Table 1 - Wholesale Average Prices and Indexes for Edible Fish and Shellfish, September 1955 With Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices1/ ($)		Indexes (1947-49=100)			
			Sept. 1955	Aug. 1955	Sept. 1955	Aug. 1955	July 1955	Sept. 1954
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					109.2	111.7	103.5	113.9
Fresh & Frozen Fishery Products:					113.8	119.7	106.3	124.8
Drawn, Dressed, or Whole Finfish:					125.0	136.6	99.9	144.9
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.06	.17	58.5	167.4	57.4	167.3
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.43	.34	133.1	106.0	90.8	139.3
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.63	.60	140.4	135.4	130.3	127.5
Whitefish, L. Superior, drawn, fresh	Chicago	lb.	.95	.59	235.5	146.3	81.8	142.5
Whitefish, L. Erie pound or gill net,rnd., fresh	New York	lb.	1.10	.85	222.4	171.8	131.4	151.6
Lake trout, domestic, No. 1, drawn, fresh	Chicago	lb.	.60	.55	123.0	111.7	93.2	108.6
Yellow pike, L. Michigan & Huron, rnd., fresh	New York	lb.	.90	.51	211.0	119.6	161.8	129.0
Processed, Fresh (Fish & Shellfish):					107.8	107.3	108.0	104.5
Fillets, haddock, sml., skins on, 20-lb. tins	Boston	lb.	.23	.34	78.3	115.7	78.3	139.5
Shrimp, lge. (26-30 count), headless, fresh	New York	lb.	.60	.62	94.5	98.0	105.9	77.4
Oysters, shucked, standards	Norfolk	gal.	5.25	4.75	129.9	117.5	117.5	126.8
Processed, Frozen (Fish & Shellfish):					93.8	99.3	106.7	91.6
Fillets: Flounder (yellowtail), skinless, 1-lb. pkg.	Boston	lb.	.39	.39	102.1	102.1	102.1	100.8
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.27	.27	84.7	84.7	83.2	95.7
Ocean perch, skins on, 1-lb. pkg.	Boston	lb.	.27	.27	108.8	108.8	106.7	111.8
Shrimp, lge. (26-30 count), 5-lb. pkg.	Chicago	lb.	.55	.61	84.1	94.1	108.8	74.8
Canned Fishery Products:					102.7	100.3	99.2	97.7
Salmon, pink, No. 1 tall (16 oz.), 48 can/cs.	Seattle	case	21.70	20.70	114.8	109.6	109.6	104.4
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/ cs.	Los Angeles	case	12.80	12.80	92.3	92.3	92.3	95.5
Sardines, Calif., tom. pack, No. 1 oval (15 oz.), 48 cans/cs.	Los Angeles	case	7.55	7.55	88.1	88.1	88.1	2/
Sardines, Maine, keyless oil, No. 1/4 drawn (3-1/4 oz.), 100 cans/cs.	New York	case	7.70	7.45	81.9	79.3	71.3	71.3

1/Represent average prices for one day (Monday or Tuesday) during the week in which the 15th of the month occurs. These prices are published as indicators of movement and not necessarily absolute level. Daily Market News Service "Fishery Products Reports" should be referred to for actual prices.
2/Not available.

king salmon continued to inch upward as the season for these species came near to ending. Because of Jewish holidays in September, all fresh-water fish prices rose substantially. Compared with September 1954, prices were higher this September for all the varieties used in this subgroup except haddock and halibut which were priced substantially lower.



Prices of the fresh processed fish and shellfish from August to September were marked by only slight changes as a group. But prices for fresh scrod haddock fillets dropped 32.3 percent from August to September, reflecting the decrease in ex-vessel prices of drawn haddock at Boston. Prices for fresh shrimp were down 3.6 percent this September but were still 22.1 percent higher than a year earlier. Light production and good demand pushed shucked oyster prices up 10.6 percent from August to September and 2.4 percent above a year earlier. The fresh processed fish and shellfish subgroup index rose 0.5 percent from August to September due primarily to higher oyster prices.

Frozen shrimp prices dropped 10.6 percent from August to September, while prices for frozen fillets of haddock, flounder, and ocean perch did not change. The September 1955 index for frozen processed fish and shellfish was 5.5 percent lower than August, but 2.4 percent higher than a year earlier. When compared with a year earlier, September 1955 prices for flounder fillets and shrimp were higher, but fillets of haddock and ocean perch were lower.

Higher canned salmon and Maine sardine prices were responsible for the rise of 2.4 percent in the subgroup index for all canned fish from August to September. Canned fish prices in September 1955 were also higher (5.1 percent) than the same month a year earlier with salmon and Maine sardines priced higher and tuna priced lower.

NEW FILLETING MACHINE

A new filleting machine for flat fish, is reported to fillet over 100 fish the size of a large Dover sole per minute. The machine is 7 feet long and 2 feet wide, completely self-adjusting, and handles fish up to 18 inches wide and 4 inches thick without sorting or manual adjustments. Meat recovery is said to be greater than the average by-the-hand method, with a further saving around the nape. In operation, the fish are placed on a feeding conveyor equipped with an automatic beheading device which, after beheading, carries them to the intake end of the filleting machine in the tail-first position. Both the fillets are removed at the same time and emerge from the discharge end on to a conveyor. The internal parts of the machine are water lubricated and the machine (weighs 600 pounds without the conveyor) is run by a 2 hp. motor.

--World Fisheries Abstracts, July-August 1954

International

UNITED NATIONS

OCEAN RESOURCES DISCUSSED AT UNESCO-SPONSORED MEETING IN TOKYO: The newly-formed International Advisory Committee on Marine Sciences set up by the United Nations Educational, Scientific and Cultural Organization met in Tokyo, Japan, October 24-25, 1955.

The meeting follows a four-day symposium sponsored by the Japanese National Commission for UNESCO and attended by representatives of marine science institutes in the Indo-Pacific region, according to an October 24 press release from the United Nations.

The meetings represent a new effort by UNESCO to pool scientific knowledge on an international scale to develop methods of investigating the resource of the sea. UNESCO's Arid Zone Committee, founded in 1951, has already begun such an attack on the question of developing the world's dry regions.

One of the major subjects discussed at Tokyo is the assistance that UNESCO can render research workers in the field of oceanography where international cooperation is considered indispensable. Even explorations of the world's oceans have yet to be completed. There is, for example, an immense expanse of the Indian Ocean lying mainly between the Equator and Latitude 40° South which is still virtually unknown territory.

It is also believed that more effective international cooperation can advance practical applications of the marine sciences--such as certain French experiments in harnessing for industrial use the difference in temperature of sea water at great depths and on the surface.

The advisory committee established by UNESCO has received numerous proposals ranging from cartography to measurement of temperatures and salinity and from submarine geology to the study of cosmic dust. Among urgent problems are the creation of research stations in areas such as Latin America and the Indian Ocean, where facilities are not adequate at present, and the rendering of assistance to established institutions. Scientists have already suggested that specialists and technicians be trained through fellowships and exchange programs and that information on the problems of the marine sciences be distributed as widely as possible by a central agency. It has also been proposed that UNESCO assist in supplying equipment, research apparatus, measuring instruments, and even in outfitting an international research ship.

In many instances, research in physical and chemical oceanography has a direct bearing on fisheries. The United Nations Food and Agriculture Organization, therefore, is represented at the meetings. In addition to the FAO, other international organizations have been invited, including the World Meteorological Organization, the United Nations Economic Commission for Asia and the Far East, and the Indo-Pacific Fisheries Council. Scientists from nine nations participated in the meeting of the advisory committee.

NORTH PACIFIC FISHERIES COMMISSION

THIRD ANNUAL MEETING: The third annual meeting of the International North Pacific Fisheries Commission opened in Tokyo on October 31, 1955.

The Commission members representing the three countries participating in the commission, United States, Canada, and Japan, were scheduled to discuss the Commission's program of work and budget for the coming year, as well as other topics of mutual concern covered by the convention.

United States members of the Commission attending the Tokyo conference were: Milton E. Brooding, San Francisco, Chairman of the United States section; Edward W. Allen, Seattle; John H. Clawson, Anchorage, Alaska; and John L. Farley, Director of U. S. Fish and Wildlife Service, Washington, D. C.

INTERNATIONAL LAW COMMISSION

SEVENTH-SESSION REPORT ON REGIME OF THE HIGH SEAS SUBMITTED: Important progress in the task of codifying maritime law is indicated in the report of the International Law Commission (ILC) which contains draft articles for the Regime of the High Seas and for the Territorial Sea, an October 3, 1955, United Nations news release points out.

The report covers the work of the seventh session of the ILC and is submitted to the current session of the General Assembly (Doc. A/2934). The proposals are provisional drafts which have been submitted to governments for comments. They are not scheduled to come before the Assembly in final form until the 11th Assembly session in 1956.

In its proposals on the Regime of the High Seas, the Commission submits for the first time provisions relating to such subjects as Piracy, Ships Sailing Under Two Flags, Right of Visit, and Right of Pursuit.

Draft articles on the Regime of the Territorial Sea include one on the controversial question of the breadth of territorial waters. On this the Commission does not take a precise stand. Its draft Article 3 states:

"The Commission recognizes that international practice is not uniform as regards the traditional limitation of the territorial sea to three miles."

It goes on to add: "The Commission considers that international law does not justify an extension of the territorial sea beyond twelve miles. The Commission, without taking any decision as to the breadth of the territorial sea within that limit, considers that international law does not require States to recognize a breadth beyond three miles."

The Commission's draft proposals on these two main topics--regime of the high seas and of the territorial sea--are summarized below.

Regime of the High Seas: On this, the Commission has submitted 38 draft articles, with comments to be submitted to governments for observations.

The text defines the term "high seas" as all parts of the sea which are not included in the territorial sea or internal waters of a State.

Freedoms of the high seas which, it states, are not subject to the jurisdiction of any state, comprise: the freedom of navigation, of fishing, of laying submarine cables and pipelines, and of flying over the high seas.

The Commission says that in order that these freedoms should be enjoyed

by all nations, international law recognizes certain rules safeguarding their exercise. Among the points covered by these rules are the right of states to exercise sovereignty on ships flying their flags, certain policing rights, rights of conservation of the living resources of the high seas, and rights concerning the continental shelf.

In draft articles 3 to 23, the Commission has attempted to codify the law relating to the various aspects of navigation, including the nationality of ships; right to a flag; the status of ships sailing under two flags; immunity of warships and other State ships; signals and rules for the prevention of collisions; penal jurisdiction in matters of collision; duty to render assistance; slave trade; piracy; right of visit; right of pursuit; and pollution of the high seas.

One of the controversial points dealt with by the Commission, in the course of its consideration of the articles on navigation, relate to piracy.

In ten articles (24 to 33), the Commission deals with fishing on the high seas. In article 24 the Commission lays down the principle that every state can claim for its nationals the right to fish on the high seas. The Commission accepted no exception to that principle, it said, in the parts of the high seas covering the continental shelf, except as regards sedentary fisheries. Nor does it recognize the right to establish a zone contiguous to the coasts where fishing can be exclusively reserved to the nationals of the coastal state.

CONSERVATION OF LIVING RESOURCES OF THE SEA: The principle of the freedom of the seas, however, the Commission considers, does not preclude regulations concerning the conservation of the living resources of the sea--a subject dealt with by the Commission in articles 25 to 33. The Commission adds that states may still conclude conventions for the regulation of fishing, but the treaty obligations arising from such conventions would be binding only on the signatory states.

In adopting these articles, the Commission says it recognized that the existing law on the subject does not adequately protect marine fauna against waste or extermination which constitute a danger to the food supply of the world. Also, insofar as it renders the coastal state or states directly interested helpless against wasteful and predatory exploitation of fisheries by foreign nationals, the existing law constituted an inducement to the states in question to resort to unilateral measures of self-protection, which are sometimes at variance with the law as it stands at present, because they result in the total exclusion of foreign nationals.

The Commission communicated the section on fishing, with an annex, to a number of technical bodies which were represented by observers at the International Conference on the Conservation of the Living Resources of the Sea, held in Rome last spring. The Commission states that it has taken note, "with great interest," of the report of the Conference (Doc. A/CONF. 10/5/Rev.1).

Articles 34 to 38 of the Commission's draft on the regime of the High Seas confirm the right of all States to lay submarine cables, pipelines, telephone and telegraph cables. Measures regarding their protection also form the subject of articles drafted by the Commission.

Regime of the Territorial Sea: The Commission continued its work on this subject by amending, in the light of comments received from governments earlier this year, some of the provisional articles drawn up at its 1954 session.

By its first two draft articles under this heading the Commission declares that the sovereignty of a state extends to a belt of sea adjacent to its coast, described as the territorial sea. This sovereignty of a coastal state extends also to the air space over the territorial sea as well as to its bed and subsoil.

As mentioned at the beginning of this release, the Commission suggests that the maximum limit of the territorial sea should be twelve miles. While not taking any decision as to the breadth of the territorial sea within that limit, it considers "that international law does not require States to recognize a breadth beyond three miles."

Some members of the Commission, the report states, held the view that the breadth of 6 to 12 nautical miles fixed by certain states for their territorial sea had the same juridical validity from the point of view of international law as the breadth of three miles applied by other states. The Commission, however, did not accept that view.

The Commission felt that the task of harmonizing the different views, which, it states, stemmed from different political or economic conditions, should be entrusted to a diplomatic conference.

In other draft articles on the regime of the territorial sea, the Commission deals with the methods of measuring the breadth of territorial waters and with the law concerning roadsteads, islands, drying rocks and shoals, delimitation of the territorial sea in straits and at the mouth of a river, delimitation of the territorial sea of two States, the coasts of which are opposite each other; and delimitation of the territorial sea of two adjacent states.

Eleven articles (16 to 26) deal with the right of merchant vessels to innocent passage through the territorial sea. The Commission states that for this right to be claimable, the passage must in fact be an innocent one. Passage would not be innocent if the vessel committed any acts prejudicial to the security of the coastal state or contrary to the "present rules," or to other rules of international law.

Other articles relating to the right of innocent passage define, among other things, the duties of the coastal state, the rights of protection of the coastal state, duties of foreign vessels, charges to be levied upon foreign vessels, arrest on board a foreign vessel, arrest of vessels, government vessels operated for commercial purposes, passage of warships and nonobservance of regulations by warships.

Final Report to be Submitted to the 11th General Assembly: In accordance with a General Assembly resolution of last year, the International Law Commission will submit a final report on both the Regime of the High Seas and Regime of the Territorial Sea--and all related problems--to the eleventh session of the Assembly in 1956.

TERRITORIAL WATERS

COSTA RICA SIGNS SANTIAGO PACT ON TERRITORIAL WATERS: The quadripartite conference between Chile, Peru, Ecuador, and the United States ended October 5. The three signatories (Chile, Peru, and Ecuador) of the original Santiago pact opened it to signature by other countries only for the extension of the juridical principle of territorial waters, and Costa Rica immediately signed.

Australia

TUNA PRICE AGREEMENT REACHED: An Australian fish canner has agreed to pay 5½d. (5.11 U. S. cents) per pound for southern bluefin, albacore, and yellowfin tuna this season delivered at either the Eden or Narooma (Australia) canneries, up to a total of 1,000 tons. Fish must be a minimum of 10 pounds each and there is a limit of 40 tons on any one day's deliveries.

The above was agreed to between the company and the Tuna Boat Owner's Association of Australia at a meeting held at the Eden cannery in September. Last season the price was 8d. (7.43 U. S. cents) per pound at the beginning of the season but fell to 5d. (4.65 U. S. cents) per pound, reports the August 1955 Fisheries News Letter of the Commonwealth Director of Fisheries.

Cambodia

FISHERY RESOURCES IMPORTANT: Although the Cambodian economy is chiefly agricultural, fishing occupies an important place, and its fresh-water fishing industry is unique in this part of the world. The Great Lake of the Tonle Sap is a veritable inland sea producing an average commercial crop of about 50,000 metric tons a year.

But actually fishing is carried on throughout the country, other areas producing 80,000 tons a year of fresh-water fish, in addition to 30,000 tons of salt-water fish. It is said that every Cambodian farmer is also a fisherman, and this is to a great extent true.

Nets, traps, and lines are to be seen all along the rivers, and in the interior there are artificial fish ponds and those formed by the recession of the flood waters.

Fish are an important element in the Cambodian diet, and in addition they are exported fresh, dried, salted, or smoked. Some fish oil is produced, in addition to large quantities of a fermented sauce made from pressed fish and highly regarded in Vietnam, reports a recent dispatch from the United States Consulate at Phnom Penh.

Costa Rica

DUTY ON PULVERIZED OYSTER SHELL REDUCED: Costa Rican import duties on pulverized oyster shell for poultry feed were reduced by Decree No. 18 effective August 20, 1955. The new rate of duty is 0.10 colon (about 1.8 U. S. cents) per gross kilo and the c.i.f. ad valorem rate of 4 percent; the former rate was 1.0 colon (17.6 U. S. cents) and 20 percent, respectively.

El Salvador

SHRIMP PRODUCTION IN EL SALVADOR: The annual production of shrimp in El Salvador is estimated to be close to 250,000 pounds, points out the United States Embassy at San Salvador. The most productive areas are located along the eastern two thirds of the coast and in the Gulf of Fonseca, and the best fishing season is from November-June.

The shrimp catches are made up of three species of the genus Penaeus, with P. styloristris the most abundant. The catches consist of about 50 percent 18 or under heads-on shrimp to the pound, 25 percent 18 to 35 count to the pound, and 25 percent small or over 35 to the pound. It is estimated that 150,000 pounds are marketed raw, either heads-off or heads-on (some are frozen for local consumption) and 100,000 pounds heads-on cooked or salted.

At the present time only two trawlers plus a number of canoes are engaged in the shrimp fishery. Most of the production is consumed locally, and only very small quantities are exported. There is some possibility that both production and processing will increase in the future.

Canada

NOVA SCOTIA FISHERIES OUTLOOK GOOD: In a statement given at hearings held by the Gordon Commission at Halifax, October 19-21, 1955, the Canadian Deputy Trade and Industry Minister stated that the outlook for Nova Scotia fisheries was good.

There was need for plant expansion, and the financial assistance required was not within the ability of the Provincial Government. "Without fairly rapid expansion and modernization parts of the Nova Scotia fishing industry lie in danger of losing ground," he said. Consideration would have to be given for some policy of financial assistance. Import tariffs in certain countries presently hamper the establishment of a fish stick industry in the Province. The fish is chiefly shipped to the United States in bulk, whereas the finished product (fish sticks) would bring 30 cents a pound, he continued.

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GREAT SLAVE LAKE FISH CATCH, SUMMER 1954: Production on Great Slave Lake during the 1954 summer fishing season was the highest recorded since the opening of the lake to commercial fishing. An intensive quality-control program was maintained by the industry which resulted in a high-quality export product on the Chicago, Detroit, and New York markets.

Five companies operated during the season and 50 resident commercial licenses, 128 nonresident commercial licenses, and 28 treaty Indian permits were issued, the Canadian Trade News reports.

Fishing started on June 13, 1954. The first lifts were landed at Hay River on June 14. Early September saw an over-all reduction in operations due to lack of ice for chilling fresh fish, but limited operations continued to the close of the season on September 15.

Average ex-vessel prices were much the same as the previous year--8 Canadian cents a pound for whitefish; 10 cents a pound for lake trout, and 5 cents a pound for inconnu, pike, and pickerel.

Summer production was 4,173,064 pounds, made up as follows; whitefish, 2,252,223 pounds; lake trout, 1,889,960 pounds; inconnu, 26,854 pounds; and others, 4,028 pounds.

Kakisa Lake, located about 90 miles west of Great Slave, produced 73,233 pounds of pickerel. Two companies took part in this operation with a total of 15 fishermen, 5 of whom were resident fishermen, 3 nonresident, and 7 treaty Indians. Although the over-all production from the lake is small, it is very important as it supplies the producer with pickerel which is not found in commercial quantities in Great Slave Lake.

The 1954/55 winter season opened on December 1, but due to mild weather little ice had formed on Great Slave Lake and until the middle of the month, only a few companies were operating.

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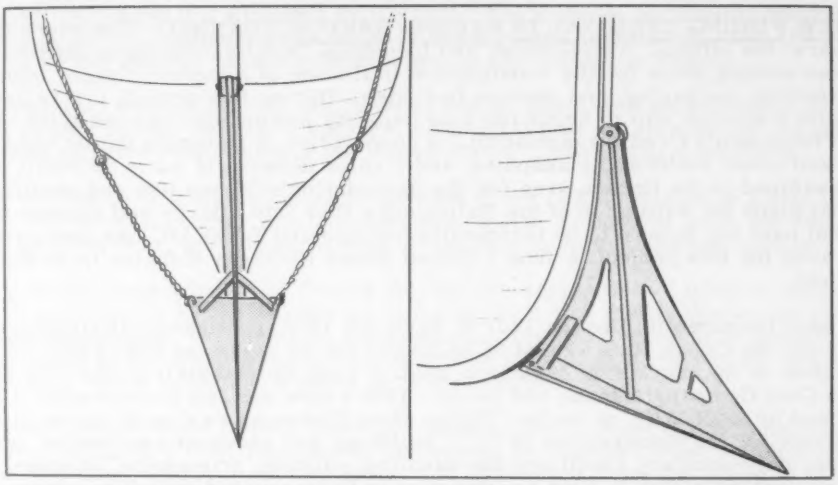
RAM ON VESSEL'S PROW KILLS SHARKS: Responding to an urgent appeal from fishermen the Canadian Federal Department of Fisheries has devised effective means of coping with basking sharks which, in recent years, have become a growing menace to salmon fisheries in certain parts of the British Columbia coast. With the installation of a specially-built razorlike ram on the bow of the Fisheries Protection vessel Comox Post, a heavy toll of basking sharks has been taken in the Barkley

Sound area. Reports from fishery officers indicate that since the Comox Post was fitted with this equipment, 41 basking sharks have been destroyed. A bag of 18 was the highest recorded for a day, that Department's August 1955 Trade News points out.

Damage to gill nets and trolling gear through basking sharks has been a problem to fishermen for many years. Feeding on the same food as salmon, the big ani-



Front and side views of the knifelike ram fixed on the bow of the Comox Post, a Canadian Fisheries Protection vessel.

mals, some attaining 30 feet in length, frequent the same areas as salmon and are usually present in greatest numbers at the height of sockeye salmon fishing.

Since no commercial use has yet been found for them, the presence of basking sharks in a salmon school is a fisherman's nightmare. When these creatures become snared in nets they do heavy damage and may easily destroy hundreds of dollars' worth of webbing in a few minutes. Trolling gear is equally vulnerable if hooks catch in the hides of the monsters. As many as fifty of these pests may gather in an area where salmon are feeding, making it impossible for fishermen to risk putting out their nets. One fisherman summed it up: "We scout and find salmon but lose our enthusiasm when we see those large, menacing fins."

Fishermen and fishing companies have tried for many years to find an answer to this problem. Harpooning has met with limited success but is too slow to be fully effective. Rifle fire has been discarded as ineffective and a possible danger to other craft in the vicinity.

The new method is an improvement on a device tried in Rivers Inlet by a fishing company some years ago. The bow of the Comox Post is fitted with a pointed steel ram, sharpened on the forward edge and hinged. When not in use it is carried in a closed position above the water line, after the style of a closed clasp-knife. In operation the ram is lowered from the hinge by a cable so that its point and cutting edge is just beneath the surface of the water and facing upwards. Chain braces on either side of the bow keep it firmly in position.

When sharks are sighted the vessel is steered directly for the school. As this species normally floats close to the surface, individuals are easily picked out and rammed. Besides reducing the number of sharks in these waters, the attacks break

up and scatter the schools making it reasonably safe for fishermen to operate in the immediate area.

Cuba

NEW FISHING TERMINAL IN HABANA HARBOR PLANNED: For more than two years, the official Agricultural and Industrial Development Bank (BANFAIC) has been making plans for the construction in Habana of a modern fishing terminal with freezing, packaging, and storage facilities. During this period, the Tallapiedra Pier with a storage unit of about 150 tons capacity was brought into use by the "Felipe Poey Fishermen's Credit Association," a cooperative of Habana's major fishing units organized under BANFAIC's auspices, and a sales network of some 50 retail outlets was developed in the Habana area for the Association's frozen fish and shellfish. Original plans for expansion of the Tallapiedra Pier into a large and modern fishing terminal have not proven to be technically feasible and BANFAIC has now turned to a new area for this project, a June 1 United States Embassy dispatch from Habana points out.

Under Presidential Decree 1202 of April 19, 1955, published in the Gaceta Oficial on May 26, the Cuban State rented to BANFAIC for 30 years, at US$12 per year, the State lands on the north side of Habana Harbor lying immediately to the east of the Havana Coal Company's docks and yards. This ample and fairly convenient site is to be used by BANFAIC, or by the "Felipe Poey Fishermen's Credit Association," exclusively for the construction of ". . . buildings and necessary works for carrying out under duly-sanitary conditions the handling, canning, processing, storage, and industrialization of fish." Such construction is to be carried out at the expense of the renter and construction work is to be completed within 10 months after the site is formally occupied.

According to an informed BANFAIC official, this formal acceptance of the site will be delayed pending the study and recommendations to be made by a technician from the Food and Agriculture Organization (FAO). This same source advises that, as now planned, the projected fishing terminal will cost about one million U. S. dollars. Financing arrangements have not as yet been completed but it is expected that some assistance will be provided, probably on a loan basis, through BANDES, executive agency for the Government's 350-million dollar Development Program.

Egypt

NEW FIRM PLANS TO BUILD FREEZER: An established firm in Alexandria proposes to form a new firm with the help of American capital for the purpose of building a freezing plant to freeze shrimp, spiny lobster, and possibly sole fillets. The frozen products will be exported to the United States, according to an October 12 dispatch from the American Consul at Alexandria.

Although the amount of American capital to be invested was not disclosed, it is understood that the dollar investment will be close to 30 percent of the Egyptian firm's capital. The use of foreign capital enables the new firm to benefit by a seven-year tax exemption.

It is planned to purchase shrimp deveining and peeling machinery from the United States.

The spiny lobster is available only in the Red Sea, and in order to utilize these resources, the new firm plans to purchase a suitable vessel for transporting the spiny lobster from the Red Sea to Alexandria. Preliminary negotiations for the purchase of such a vessel are being held with an Italian ship builder.

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PLAN TO IMPROVE FISHING INDUSTRY: The average per capita consumption of fish in Egypt is between 3 and 4 kilos (6.6-8.8 pounds) against 40 kilos (88 pounds) in Japan, 30 (66 pounds) in Great Britain and 25 (55 pounds) in France.

It was also pointed out that the price of fish in Egypt was unreasonably high as compared with prices in other countries, although Egypt is surrounded by the Mediterranean and Red Seas, reports the United States Consulate at Alexandria.

According to official statistics 60 percent of the fish consumed in Egypt (equivalent to 40,000 metric tons) was obtained from lakes, 25 percent from the Mediterranean and Red Seas, and the remaining 15 percent from the Nile and canals.

A plan for improvement of fishing through the application of modern methods, which is under study by the Ministries of Agriculture and Public Works and other government agencies, would induce fishermen to take more interest in modern methods of fishing in the Mediterranean and Red Seas instead of fishing in the shallow waters of the lakes using the present primitive methods.

In the opinion of the Deputy Director-General of the Coast Guard Administration, 80 percent of Egypt's requirements of fish should be obtained from the Mediterranean and Red Seas, 10 percent from lakes, and 10 percent from the Nile and canals.

The plan also provides for draining the greater part of some lakes. The total area of Lakes Menzala, Burollos, Edku, and Mariut is 544,000 feddans (about 565,000 acres), of which 434,000 feddans (about 450,000 acres) would be drained and put under cultivation, thereby increasing Egypt's agricultural production.

It is expected that the plan would be carried out before the end of the current year.

French West Africa

DEVELOPMENT OF COMMERCIAL FISHING: The prospects of developing commercial fishing on a modern industrial scale in French West Africa have been the subject of considerable study and discussion for several years, both from the point of view of further developing the economic resources of the country and from the point of view of supplying European markets and increasing available proteins for the African diet. Studies, recently confirmed by actual trials on a commercial scale, have indicated that the coastal waters of French West Africa may well support one of the most abundant and varied populations of marine life in the world. Fresh-water fishing, already exploited to some degree in several parts of the Federation, offers considerable opportunity for further development as a supplement to the domestic food supply, an August 25 dispatch from the United States Consulate at Dakar points out.

Marine Fisheries: In regard to marine fishing, the types of known edible marine life may be divided into three categories: (1) the ordinary run of the catch, (2) the select or quality types, and (3) those which lend themselves best to canning.

The first category is that which has been traditionally taken by native fishermen working from ocean-going dugout canoes (pirogues) for the supply of the local market. The largest part of this catch, as is the case with fresh-water fish, is consumed fresh although small quantities are salted or smoked for preservation or for shipment to other points in Africa. The Government General of French West Africa has long been interested in this type of fishing and attempts have been made to motorize native boats and otherwise modernize native fishing methods in order to increase the total catch. Increased consumption of fish would be a substantial improvement in the native diet. In spite of the efforts of the Government, however, little has been accomplished. The delicate relationship between prices and supplies of fish on the local market, the effect of lower prices on the income of the 25,000 to 30,000 Senegalese fishermen, the lack of modern equipment and the high initial investment required to furnish it, and the total lack of personnel trained in the use of modern equipment have combined to retard action to modernize the local fishing industry.

In recent months several Breton fishing trawlers have been working out of the Port of Conakry (French Guinea) with considerable success. It is presumed, however, that these boats are entirely or almost entirely manned by French crews. These five trawlers, varying from 30 to 56 feet over-all, have been supplying Conakry and the environs with an average of about 3 metric tons of fish a day as compared to one ton provided by all the native fishermen. The increased supply of fish has, of course, triggered a considerable price decline and has undoubtedly placed the native fishermen in a very precarious position, but it has also tripled the consumption of fish in and around Conakry. About a third of the fish is smoked and sent into the interior. While smoking is presently being done using traditional native methods, the Government has announced plans to install several trial smoking ovens as part of the 1955/56 economic development program. In Dakar, at least for the moment, it appears that the Government is not encouraging the operation of modern trawlers in competition with the native fishermen, perhaps because the region in and around Dakar supports a much larger native population whose entire livelihood depends on fishing. A sizable drop in prices caused by greatly increased quantities of fish on the local market could have serious consequences for the native fishermen and leave them without support since they would for the most part be unemployable aboard modern trawlers without extensive training.

It is for this reason, perhaps, that the Government General seems rather to be concentrating on the development of types of fishing around Dakar which will not have undesirable repercussions on the native fishing population. Spiny lobsters and tuna exist in huge quantities in local waters and both appear to offer considerable opportunity for commercial development. Lobsters are taken by local fishermen for the Dakar market and for shipment both to the interior and to France. According to press reports, a local firm has exported by air to France about 50 metric tons of these crustaceans during the last two years and has supplied another 20 tons to markets in the interior or to the south. It is understood that this firm is undertaking the building of a covered pond (about 4,300 square feet) which will be filled with sea water and will be used for preserving the spiny lobsters alive until the moment of shipment. Of course, they could be shipped cooked and frozen, or the tails alone could be shipped frozen.

The Government General has just constructed a wharf for the use of fishing vessels not far from the installations of the firm mentioned above. The wharf is being joined to the firm's establishment by a road which will also serve seven other industrial lots to be ceded to firms who desire to install processing facilities for the local fishing industry.

In recent years, lobster boats have come from as far as Brittany to fish the coastal waters of Senegal and Mauretania from Sangomar Point north to Rio de Oro. The operations of these vessels, however, have been limited to three voyages per year because of the long journey to and from Brittany where the catch is landed.

With the local preservation facilities mentioned above, it is hoped that the Breton fishermen will find it more profitable to land their catches in Dakar for shipment by air to France or elsewhere. This would enable them to spend much more time actually fishing.

The third, and perhaps the most important, type of fishing for the future is for those species which lend themselves to canning. Although it is understood that during World War II several sardine canneries were in operation in and around Dakar, these enterprises could not maintain themselves after the war in the face of competition from Europe and Morocco. Today the big hope of the local fishing industry is for tuna. In 1954 and 1955 four tuna boats, at least one of them subsidized by the Government General of French West Africa, made trial runs in the coastal waters off Portuguese Guinea, French Guinea, and Sierra Leone. Although the exact outcome of these trials are not known, the local press has given some indication of the results and has proclaimed them a success. It has been reported that in several weeks of fishing in the area off the Bissago Islands off the coast of Portuguese Guinea, 84 tons of tuna (albacore) were taken. On a second voyage, this time south of the Bissagos to Sherbro Island off the coast of Sierra Leone, the Yolande Bertin, described as an "American clipper," is reported to have taken 50 tons of tuna in three days. A further voyage by a Government-sponsored vessel, fishing the waters south of Sherbro Island as far as Abidjan (Ivory Coast), is reported to have been less successful. At any rate, considerable information was gathered on the concentration and movement of the tuna during the fishing season, and it is alleged that the results were such as to confirm the possibility of profitably operating a sizable tuna fleet in these waters. In fact, the local press has carried reports of the preparation of numerous Breton tuna boats for service in West African waters during the current season, scheduled to begin in October or November 1955.

Reports indicate that the arrival of a large tuna-fishing fleet in the near future are, to say the least, somewhat optimistic. In addition to further problems which may be encountered at sea incident to actual fishing operations, there are a number of other questions which remain to be solved. It has been reported, for instance, that the few boats which operated in coastal waters last year were considerably hampered by the lack of established channels for supplying live bait. The tuna boats were forced to fish their own bait which, of course, limited the time they could spend pursuing the tuna. Another question which would certainly arise should a large fleet of fishing vessels descend on Dakar would be the matter of housing. Finally, there is the question of local preservation of the catch and shipment to the cannery. For the moment it is not considered likely that an attempt would be made to can tuna locally. French West Africa is a country of high production costs and, perhaps more important, Africa would not be under present conditions the major market outlet for canned tuna. The latter point would seem to make it economically unfeasible to can the tuna here when it could be cleaned here, frozen, and shipped to Europe for canning close to the point of consumption.

As to local preservation of the fish, Dakar has a refrigeration and freezing plant built by the Government General more than two years ago as part of the development plan for the Port of Dakar, but the plant has never been used to any profitable extent. It is at present too large in relation to the demand for such services (two small privately-owned and operated refrigeration plants handle the bulk of the present business). It is understood that the quick-freezing facilities of the plant are capable of handling up to 20 metric tons of fish per day, but up to the present time this has remained in the realm of pure theory.

It is apparent that the future of industrialized commercial fishing in French West Africa depends on the solution of a number of problems. That commercially-valuable species of fish and crustaceans exist in abundance has been proven, but the manner of exploiting these resources to the benefit of the country and to the satisfaction of the fishing industry, the canners, and the consumers has yet to be worked

out. Modernizing the local native fishing will probably prove to be the most difficult phase of the attempt to industrialize fishing in French West Africa not only because of the need for a sizable sum of money to invest in modern fishing equipment but because of the need to train personnel and to put the whole project into operation without destroying entirely the livelihood of a large number of African fishermen who would not be immediately employable aboard modern fishing trawlers. As regards lobster and tuna fishing, there is not the same risk of undesirable economic and social reverberations. Lobster and tuna fishermen would not be dependent on the local market for consumption of their catch and would not compete with the local native fishermen. There are some indications that both lobster and tuna fishing are going to develop into industries of some importance to the economy of French West Africa, contributing to the food supply of certain European countries and eventually to Africa. The results of the current season (1955/56) should give an indication of whether the hoped for industrialization is going to be accomplished within the next few years or not.

FRESH-WATER FISHERIES: Africa, from the point of view of food production, is a poor continent, the average yields of agricultural and pastoral products being greatly inferior to that of most parts of the world. There is, however, another smaller but perhaps richer domain open to increased exploitation, that of the fresh-water resources of the country. It is not too well known, for instance, that the Territory of French Sudan produces about 50,000 metric tons of fish annually taken from the Niger River between Markala (Sansanding) and Ansongo. The principal zone of exploitation is the so-called Central Delta of the Niger between Diafarabe and Kabara (near Timbuctu) and the marketing center is the river town of Mopti. While the fish taken in this part of the Niger constitute the bulk of the annual catch of fresh-water fish, there are also about 2,000 tons of fish taken annually from the Niger below Timbuctu mostly by fishermen from British Nigeria. Most of this catch is dried or smoked and taken back down the river to Nigeria at the end of the fishing season. In addition, the coastal lagoons of lower Dahomey yield 8,000 to 10,000 tons of fish annually and the middle and lower Senagal River another 500 to 1,000 tons. Unhappily, in Dahomey the increasing number of persons engaged in fishing the lagoons (only a quarter of the 100,000 persons involved are professional fishermen), the abandonment of the traditional rules governing fishing, and the destructive methods currently employed threaten the future development of commercial fresh-water fishing.

Along the Niger, river fish are either eaten fresh by the fishermen and their families or dried or smoked, depending on the variety of fish, then set aside for family provisions or wrapped in palm matting for shipment to market. While Mopti is the marketing center for the sale of river fish in the Sudan, shipments of dried and smoked fish are sent as far as the Upper Volta, the Ivory Coast, and the Gold Coast. Shipments outside the territory amount to about 6,000 tons per year.

The outstanding problem in regard to fresh-water fishing is the preservation of the catch. It is estimated, for instance, that 40 percent of the fish production of the Sudan is lost due to poor preparation and inadequate packaging for shipment, the failure to utilize certain wastes for cattle feed, and above all due to insect (dermestes) infestation in the dried fish. Infestation alone is the cause of the loss of 25 to 30 percent of the tonnage. In order to cut down the high losses due to infestation, the present Four Year Plan has provided funds for launching a control program against the attacks of these insects. The Plan, incidentally, also provides for the construction of a fish hatchery in Bamako.

Formosa

TUNA BOATS TO BE BUILT WITH JAPANESE MATERIALS: The Taiwan Shipbuilding Corp. is negotiating an agreement, on behalf of the China Fishery Co., with the Niigata Engineering Co., Ltd. of Japan, under which the Japanese firm will supply US$680,000 worth of materials required to build four 350-ton tuna fishing vessels. The Taiwan Shipbuilding Corp. has proposed that 40 percent of the total amount of procurement (US$272,000) be financed through the Bank of Taiwan and the remaining 60 percent (US$408,000) to be advanced in the form of a loan for three years through a Japanese bank.

The Economic Stabilization Board at its 53rd meeting, upon the recommendation of a Committee, on June 16, 1955, approved this proposed agreement. Subsequently, the Economic Stabilization Board, on August 29 requested the Bank of Taiwan to grant the loan of US$272,000 and to act as guarantor on the US$408,000 loan to be advanced the Japanese bank. The Bank of Taiwan, in a letter to the Ministry of Economic Affairs, dated September 7, agreed to extend the loan in principle but indicated that an approval from the Executive Yuan must be secured for their guarantee of the loan by the Japanese bank.

Germany--East Zone

FISHING FLEET EXPANSION PLANNED: The fishing fleet of the east zone of Germany presently consists of 6 trawlers, 35 luggers, and 200 cutters, which are expected to land a total of about 85,000 metric tons of fish in 1955. Current plans envisage the addition of 9 trawlers, 25 luggers, and 50 cutters, according to articles in the West German press, reports the United States Consulate at Bremen in a July 20 dispatch. However, reports indicate some doubt about whether these plans will actually materialize since shipyards in the East Zone of Germany are overburdened with orders from the Soviet Union.

The increase in fish production is expected to diminish imports, which at present amount to about 115,000 tons per year (Federal German Republic supplied 39,000 tons in 1954). Fishery port facilities in the East Zone, refrigerated storage space, ice plants, fish-meal factories, and the fish-processing industry are reportedly being improved and enlarged. Allegedly, the government is extending financial aid for the operation of fishing cooperatives. A new fish research institute has been founded which will cooperate closely with its Polish counterpart.

It is a depressing fact to the authorities that the fishing industry in the East Zone of Germany is still operating in the red. The lugger fisheries in Rostock need annual government subsidies. The deep-sea cutter fleet of Sasanitz is still losing money in its operations. Serious complaints are furthermore being voiced about the fact that measures intended to improve the quality of the fish are slow in taking effect, fishing vessels in need of repair are out of action for many months on account of the overburdening of the shipyards, and the production of canned and marinated fish cannot keep pace with the rising fish landings. Reportedly, the construction of additional refrigerated storage space in the Baltic ports will be started presently to improve fish supply to the population.

Iceland

FISH CATCH, JANUARY-JULY 1955: During the first seven months of this year the Icelandic fish catch amounted to 285,646 metric tons--an increase of 4.5 percent over the same period last year. The herring fisheries which opened in July yielded in that month only 19,800 tons--about the same catch as in July 1954, which is considered a poor catch.

The increase in the total fish catch this year is due to more white fish. Slightly over 40 percent of the white fish catch this year was used for the production of fillets of frozen cod, haddock, ocean perch, etc., in contrast to last year when about half of the catch was used for that purpose. This change is caused by new market conditions. A larger share than last year has been used for stockfish and salted fish.

The catch by the motorboat or inshore fleet this year has risen by 12 percent, while the catch by trawlers or offshore fleet has declined by 8 percent, reports the September 1, 1955, issue of Aegir, an Icelandic periodical.

Israel

ISRAEL DEFINES TERRITORIAL WATERS: The Government of Israel announced on September 11 a decision to define its maritime frontier as extending six nautical miles, airspace included, from the Israeli coastal low-water line, states an October 7 dispatch from the United States Embassy at Tel Aviv.

The decision takes effect immediately; but its enforcement shall begin on November 1, 1955, from which date measures shall be taken, if need be, to protect the sovereignty of the State in the aforesaid areas.

Italy

REVIEW OF THE FISHERIES: Imported Fish Needed to Supplement Domestic Catch: Although Italian fish landings have risen slowly in postwar years, demand for imported fish continues strong, the Canadian Foreign Trade of July 9 points out. The greatest demand is for salted cod and canned chum salmon.

Table 1 - Italian Fishing Fleet at End of 1953

Type of Vessel	No.	Gross Tonnage
Motor trawlers	2,555	59,685
Motorboats	4,804	16,015
Sailing and other boats . .	36,724	54,271
Total	44,083	129,971

Italy has allocated dollars for the import of Canadian fish during the 1955/56 season, but sales will depend largely on the availability of high-quality salted cod and canned chum salmon. Italian fish imports in 1954 totaled 106,069 metric tons, an increase of 9.4 percent over 1953 (96,910 tons), but 16.8 percent less than in 1952 (127,751 tons). In that year, however, imports of salted cod and stockfish were unusually high.

The general pattern of imports showed little change during the past year. Salted cod continued to head the list, followed by fresh and frozen fish, canned sardines and anchovies, and canned tuna.

Modernizing the Fishing Fleet: Italy emerged from World War II with a badly depleted fishing fleet; the vessels which survived were old and used obsolete means of propulsion. In the postwar years the industry has carried on a program for the steady modernization of the fleet, aided by a number of government measures which provided subsidies. The most recent of these--the Act of August 6, 1954--authorized an allocation of Lire 200 million (approximately US$320,600). It was to be used for the following--building and modernization of fishing vessels; installation of plants for the processing of fish products and byproducts; establishing plants for the manufacture of nets and other fishing equipment; building and improvement of wholesale markets; provision of workshops for repairs to vessels, etc.; purchase or renewal of nets and other equipment and of shore and floating refrigeration facilities.

Table 2 - Italian Marine Fish and Shellfish Catch, 1949-54

Year	Quantity (Metric Tons)
1954	157,680
1953	155,979
1952	162,407
1951	137,023
1950	136,747
1949	130,969

Catch: The revitalization of the fishing fleet has resulted in a gradual increase in production (table 2).

According to semiofficial figures, approximately 118,000 persons were employed in coastal and deep-sea fishing at the end of 1953.

Fishing is carried on along the entire 4,367 miles of Italy's coastline, but certain areas are more productive than others. Of great importance is the Adriatic coast where, in 1953, 35.4 percent of the total production of fish and 50 percent of the molluscs and crustaceans was landed. The richest fishing grounds are on the eastern Adriatic adjacent to the Yugoslavian coast, but in the postwar years Italian fishing operations in this area have been restricted. If, in the near future (as appears probable), an agreement on fishing rights is concluded between the two countries, Italian production in this area will probably increase.

Table 3 - Italian Imports of Salted Cod, 1952-54

Country of Origin	Quantity		
	1954	1953	1952
	(Metric Tons)		
Denmark	11,315	8,466	23,992
France	8,326	4,073	4,392
Iceland	12,467	12,104	15,891
Canada	4,276	6,718	5,505
West Germany	1,160	-	-
National ocean fisheries	3,730	3,814	-
Other sources	2,056	1,828	8,486
Total	43,330	37,003	58,266

Salted Cod: Because of its high protein content and keeping qualities which help distribution in areas where there is little or no refrigeration, salted cod has always ranked high among Italian foods imports. Wet-salted or salt bulk cod is the most extensively consumed, although light-salted hard-dried and Labrador cures are preferred in certain areas of the country.

Quality plays an important part in the successful marketing of hard-dried salted cod in Italy. Demand for the top grades of light-salted Gaspe and Newfoundland shore qualities is strong because these cannot be obtained from other sources of supply. Heavy-salted dried cod is supplied in quantity mainly by France, which doubled its exports to Italy in 1954. The French product competes strongly with the lower grades of Canadian light-salted hard-dried cod and because it is considerably lower in price may well threaten the Canadian trade in this market unless the high quality of the Canadian product is maintained.

Table 4 - Italian Imports of Canned Salmon, 1952-54

Country of Origin	Quantity		
	1954	1953	1952
	(Metric Tons)		
Canada	1,361	1,156	957
Other countries	33	44	45
Total	1,394	1,200	1,002

Canned Salmon: The annual increase in exports of Canadian canned salmon to Italy in the past few years, together with the fact that stocks currently held by importers are not considered heavy, augurs well for the coming season (table 4). The Italian market requires over 90 percent chum salmon. Because of the price factor, there is only a small demand for pink and red salmon.

Prospects for Season: The Italian Ministry for Foreign Trade will make available C$2 million for the purchase of Newfoundland shore and Labrador cod, $600 thousand for hard-dried slack-salted Gaspe cod, and $2.5 million for Canadian canned salmon--to be used before June 31, 1956.

Japan

ALBACORE TUNA MARKETING ARRANGEMENTS CHANGED: The Japanese Cooperative Sales Association for the control of the sale of frozen albacore tuna to the United States ceased operations on October 31, and its functions will be taken over by its parent organization, the Frozen Food Export Association. The Cooperative Sales Association was established in June 1955 by the major exporters of tuna to act as sole export agent for frozen albacore in an attempt to prevent a minority of exporters from selling at depressed prices and upsetting the market. While the immediate urgency for a separate agency to perform these functions is thought to be over, the Frozen Food Export Association will undoubtedly keep a close watch on the albacore market to forestall criticism from the United States tuna industry, states an October 21 dispatch from the United States Embassy at Tokyo.

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TUNA-BONITO FISHING INDUSTRY WORKING CONDITIONS AND WAGES: The number of tuna-fishing boats in Japan increased by 137 boats from 1953 to April 30, 1955. The total number under license in 1953 was 1,154 and in 1954 was increased to 1,263. At the end of April 1955 there were 1,291 boats with a total tonnage of 153,357 operating out of Japan and licensed by the Japanese Ministry of Agriculture and Forestry. Of these there were 472 boats of over 100 tons accounting for 97,348 of the total tonnage engaged. There were 819 ships with a capacity of less than 100 tons, according to a July 21 United States Embassy dispatch from Tokyo.

During 1954, 109 ships of less than 100-ton capacity were permitted to convert from coastal fishing to tuna-bonito fishing. By April 4, 1955, the Ministry issued permits for the building of 84 middle-sized tuna boats to replace the same number of boats going out of use. There are no present plans, according to the Ministry, to increase the number of licenses issued for tuna ships during 1955.

With the exception of a very few owners having large-sized ships of a capacity in excess of 1,000 tons, all operators are paying wages on a share basis, called the Ohnaka Keisan plan. With few exceptions large ships pay wages on a strict share basis with 72 percent of the profits going to the owner and 28 percent distributed among the crew.

More than 80 percent of tuna ships in Japan are operated by their owners. This is particularly true of the smaller sizes, i. e. under 100 tons. The earnings of tuna fishermen employed on the ships differ according to locality, the size of the boat, the amount of the catch, etc.

Generally, however, the wages will average out about the same all over Japan. Tuna fishermen earn much more than fishermen engaged in coastal operations.

Adherence to old customs in regard to special allowances and unemployment benefits is greater among the small owners than almost any other type of employer. Most of the smaller boats are manned by the owner and his relatives, both by blood and by marriage, and the adherence to ancient paternalistic customs is enhanced by this close relationship.

Most ship owners pay their employees a minimum guaranteed wage when catches are poor and during idle times when the ship is not in operation. The employer also gives special monetary considerations to employees upon marriage or when they are building houses; when their relatives die and on similar occasions.

There is a cooperative spirit among smaller ship owners in assisting their employees to build and operate their own boats. In the large ships, the crew is hired on a temporary basis with contracts seldom running for more than one year and with most of them being renewed at the end of each voyage. Crews on tuna ships are covered by the Government Social Security Program, by the Seaman's Law, and other federal statutes. Owners feel a responsibility for aged fishermen also and wherever possible give them wages for lighter work on shore.

While the wages of tuna crews vary as previously stated, perhaps an average can be deduced from the practices in Kanagawa Prefecture, which includes the port of Yokohama. The catches of tuna boats smaller than 200 tons, minus costs of fuel, fish market commissions, bait, ice, provisions of the crew, and depreciation, is divided between the owner and the crew at the rate of 60 percent for the owner and 40 percent for the crew. For vessels between 200 and 1,000 tons, the percentage is 70-30. The owners pay no other bonuses and allowances on the Ohnaka Keisan plan. It should be noted here that we are now referring to company-owned ships. As an example of the wage system, a company-owned tuna boat with a capacity of 180 tons, and a fixed crew of 22 will go out for a voyage of about 60 days and will return with an average of 20,000 kans (165,000 pounds) of tuna.

The commission paid to fish markets is 3 percent of the total sale. Other expenses will amount for an average of ¥10,000 (US$28) per ton of the ship's weight. After these deductions, the remainder is divided between the owner and the crew. Using the above figures as a guide and assuming that the selling price of tuna is ¥300 per kan (US$200 a short ton), the total catch of the average 180-ton boat would be worth approximately ¥6,000,000 (US$16,500).

After deducting expenses, the crew and owners' shares would amount to ¥4,220,000 (US$11,000). Forty percent of this amount is ¥1,688,000 (US$4,400), which divided by 22 means that each individual would receive ¥76,700 (US$200) for the two-months' trip or US$100 per month per crew member.

The captain of a tuna boat will receive approximately twice the wages of an ordinary crewman. A superintendent who goes on board, and does not assume a captain's duties also, will receive approximately four times as much as an ordinary crewman while a superintendent who is also ship's captain will receive five times the amount received by the ordinary fisherman.

Generally speaking, the fishermen of the above company average from ¥17,000 to ¥30,000 (US$47-83) per month over a period of a year. The labor turnover, in spite of the comparatively high levels of pay, is 10 percent for each voyage at this company.

One Japanese company is now experimenting on a fixed wage and incentive-wage system. This is being tried out on a large ship built last year. The employees of the crew belong to the Japan Seaman's Union and are covered by a single agreement pertaining only to this particular ship. The ship itself carries six catcher

boat during fishing operations. The base wage of all crewmen is computed at ¥15,000 (US$42) per month. Members of the catcher crews get ¥15 for each kan (US$10.20 a short ton) of tuna processed while other members of the crew receive an incentive rate of ¥7 per kan (US$4.60 a short ton). The fixed rate of ¥15,000 (US$42) per month includes the base wage, an on-board allowance, and a voyage allowance on a ratio of 3-1-1. The company pays the on-board allowance to the crew of the ship regardless of the location of the ship as long as the men remain a part of the ship's crew. A voyage allowance will be paid only when the boat is at sea. Officers of the ship also receive the ¥7 per kan (US$4.60 a short ton) on tuna caught and processed. At present the company is not paying a summer or a year-end bonus.

The company states that the wage system of tuna boats operating from ports such as Shizuoka Prefecture, Yaezu, and Shimizu is approximately the same as that in Kanagawa Prefecture but differs a little because they have a system which includes a special fund contributed to by management and labor for extra payments and job insurance.

Tuna boats in the fishing ports of the Tokohu District are operating on the share system of the total catch of 72 percent for the owner and 28 percent for the crew, with the shipowners paying operating expenses including provisions. The companies at Kurihama do not have housing facilities for employees nor other welfare services. Employees of the company working in shore canneries are paid a daily wage rate. Women workers get ¥270 (75 U.S. cents) per day while male employees get ¥300 (85 U.S. cents) per day. Crew members of smaller boats are not usually members of labor unions.

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DISPOSITION OF 1955 SALMON CATCH: The figures in Table 1 regarding the disposition of the 1955 Japanese high-seas salmon catch have been compiled from

Table 1 - Japanese Disposition of 1955 High-Seas Salmon Catch

Species of Salmon	Disposition			Species of Salmon	Disposition		
	Canned	Frozen	Salted		Canned	Frozen	Salted
	(Cases 1/)	(Millions of Lbs.)			(Cases 1/)	(Millions of Lbs.)	
Sockeye (Red)	626,604	4.0	2.5	Silver (Coho)	169,673	2.6	7.9
Chum	296,307	17.0	32.1	Spring (King)	3,133	.3	-
Pink	574,594	14.7	7.9	Others	13,789	1.4	2.0
(Continued in Opposite Column)				Grand Total	1,684,105	40.0	44.8

1/ A case consists of 96 8-oz. cans.

information received from a number of sources; while they are not official statistics, it is believed that they represent closely the actual amounts of salmon canned, frozen,

Table 2 - Japanese Prospective Exports of 1955 Canned Salmon Pack

Destination	Species of Salmon					
	Red	Chum	Pink	Silver	Spring	Total
	(Cases 1/)					
United Kingdom 2/	532,254	-	152,786	95,411	17	780,468
Ireland	12,040	-	250	-	-	12,290
Australia	61,538	9,980	23,463	3,766	-	98,747
North America	1,000	-	239,640	-	-	240,640
Europe	1,100	68,700	167,299	290	-	237,389
Africa	20	-	50	-	-	70
South East Asia	-	-	25	-	-	25
Others	165	-	330	-	-	495
Total	608,117	78,680	583,843	99,467	17	1,370,124

1/ A case consists of 96 8-oz. cans.
2/ Subject to final Japanese-United Kingdom trade negotiations.

and salted, states an October 13 dispatch from the United States Embassy in Tokyo.

The figures in table 2 on prospective exports of canned salmon from the 1955 catch were obtained from industry sources, and may represent, in part, contracts not yet concluded or exports which will not be realized.

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TENTATIVE AGREEMENT ON CANNED SALMON SALES TO BRITISH: The Japanese and British negotiators working on the payments agreement for the second half of the Japanese fiscal year (October 1-March 31) came to a tentative decision on October 12, 1955, to set the British purchases of sockeye (red) salmon at about 400,000 cases, valued at £4,460,000 (US$12.5 million). This amount is double last year's purchases, but will be a disappointment to the Japanese who had hoped to persuade the British to purchase 700,000 cases, states an October 14 dispatch from the United States Embassy at Tokyo.

Production of canned salmon by the Japanese will be close to 1,400,000 cases and it is likely that the Japanese will have to turn to markets other than the British in order to dispose of the surplus.

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FISHERIES TECHNICAL AID OFFERED: The sixth session of the Indo-Pacific Fisheries Council, Food and Agriculture Organization, received an offer by Japan to give any interested country information on her technical skills with regard to fisheries. The offer is part of Japan's advocacy of intensified exchange of fisheries information and joint investigations and research, according to the October 13, 1955 issue of Japan Report published by the Japanese Embassy at Washington, D. C.

Forty delegates from 16 countries are attending the two-week meeting in Tokyo. One of the Council's objectives is the development and proper utilization of the living aquatic resources of the Indo-Pacific areas.

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NEW FISHING COMPANY TO FISH FOR TUNA IN INDIAN OCEAN: Tuna (which are reported to abound in the Indian Ocean) are expected to comprise one of the principal catches of the 94-ton fishing vessel Meegama Maru. The vessel was reported on its way from Tokyo to Ceylon to begin fishing operations in the Indian Ocean for a new Ceylonese-Japanese joint fishing corporation, reports the September 30, 1955, issue of The Fishing News, a British fishery periodical. This is the first vessel secured by this corporation formed in March 1955 by private fishing interests in the two countries.

After production starts, the Ceylon public is promised tuna in one-pound plastic packages. The vessel will explore areas beyond the coastal areas worked by local fishing vessels.

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FISHERIES AGREEMENT WITH RED CHINA WORKING SMOOTHLY: The unofficial Japan-Red China Fisheries Agreement, between the fishermen's organizations of the two countries which was put into effect just four months ago, is working out satisfactorily, according to the leading Japanese fishing company operating in the area concerned.

Except for one minor incident which occurred shortly after the effectuation of the agreement, Japanese and Red Chinese fishing boats have been operating without discord, and with notably increased catch as a result of the agreement, an October 13 United States consular dispatch from Fukuoka (Japan) points out.

The agreement is working smoothly and with profit to the Japanese people. During June, July, and August 1955 the Japanese catch in this area shared with the Red Chinese under the agreement was up 20 percent from the former average. Largely as a result of the increased supply of fish on the market, the price dropped, and was down by 30 percent in the same period. This, without other considerations, would indicate slightly less profit for the fishing companies, although of course it meant more and cheaper fish for the Japanese consumers. However, the fishing companies were spared their former expenditures for insurance, and they no longer had to spend money on penalty charges, such as for the repatriation of seamen and captured boats, because no boats were captured by the Red Chinese.

Republic of Korea

TILAPIA MULTIPLY RAPIDLY IN EXPERIMENT TO BOOST FOOD SUPPLY: During the short period of five months 470 tilapia, a gift to the Republic of Korea from the Government of Thailand, multiplied to 30,000 in the tanks of the Chinhae hatcheries. This project was sponsored by the United Nations Korean Reconstruction agency (UNKRA) Fisheries Branch, according to a September 29 press release from United Nations.

The tilapia, noted in Southeast Asia for their fast growth and reproduction, were brought to Korea as an experiment to determine whether the fish would also thrive in Korea despite the colder winter weather.

The project appears to have passed beyond the experimental stage, according to the Agent General of UNKRA. "It is now clearly proved that they flourish in Korean waters, at least in summer; they have grown as quickly in size and multiplied in number as fast as those in tropical countries."

The 30,000 tilapia give promise of many fish dinners throughout the country about a year from now, for thousands of fingerlings will be available for distribution next spring. Already some 3,400 tilapia have been distributed from Chinhae to various parts of Korea for experiments and observation of their reaction to different climatic conditions.

The main problem between now and then will be to keep the tilapia, long accustomed to balmy climates, comfortable through the cold season, UNKRA's Fisheries Branch points out. They will have to be kept in heated tanks, separated to prevent further reproduction until late winter. After spawning takes place, the young fry will be offered to interested farmers for placing in ponds, streams, and paddies as soon as the outside weather is warm enough for them. Before the fall of 1956 they will be large enough to eat.

The project originated after President Rhee expressed interest in the success of tilapia culture in Thailand and other countries of Southeast Asia. The freshwater tilapia are viewed as a potentially-important addition to Korea's protein food supply, as many inland communities now receive few fresh ocean fish because of limited transportation, icing, and storage facilities.

The shipment of the fish from Bangkok was arranged for by UNKRA, in specially-designed tanks, to the Government hatchery at Chinhae. They were accompanied by a representative of Thailand's Department of Fisheries who advised Korean hatchery personnel on special problems of tilapia culture.

Norway

STICKWATER PLANTS INCREASE FISH MEAL PRODUCTION: A Haugesund, Norway, firm that manufactures plants for the production of fish meal, in a test made at a large byproducts factory, increased the yield of fish meal by 24 percent by adding concentrated stickwater to the press cake. During the one-week tests 1,000 metric tons of herring were used, according to the Norwegian Fishing News, vol. 2, no. 3, 1955.

The procedure of the test was as follows:

On the first day the factory produced ordinary meal and the stickwater went into the sea. The next day the stickwater was concentrated and mixed with the press cake to form whole meal, and so on for a week. Each day the herring intake was exactly weighed and analyzed. The result of this test shows that 5,400 pounds of herring processed without the use of stickwater gave 1,000 pounds of meal. With stickwater utilized in the processing 5,400 pounds of herring gave 1,240 pounds of meal.

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SONAR SOUNDER DEMAND HEAVY: A Norwegian manufacturer, who since 1947 has been manufacturing echo sounders, reports heavy demand, at home and abroad, for

its combination sonar-echo sounder. Developed in cooperation with the Norwegian Defense Research Institute and the Norwegian Fishing Directorate's Ocean Research Institute, this electronic instrument has consistently proved remarkably effective in locating fish shoals.

Sales to Norwegian fishermen outstrip by far those of the seven leading foreign makes combined. The sonar-sounder is also being exported to 14 countries. So far, it has been installed aboard 40 Icelandic fishing vessels. Results from the 20 tried during the 1955 fishing season are excellent. Consequently, all but two of the 27 fishing vessels under construction in Iceland or for Icelandic accounts at foreign yards, are slated to be equipped with the Norwegian sonar-sounder, according to News of Norway (September 29, 1955) of the Norwegian Information Service.

Panama

SHRIMP FISHERY: In the September issue (pages 107-108) of Commercial Fisheries Review the news item on the shrimp fishery of Panama on page 108 states that "The local shrimp monopoly has obtained a sizable loan. . . ." A letter from Panama points out that there is no shrimp monopoly in Panama, but there is a tendency to refer to a very large firm in this manner. In addition to the operations of a large company, there are approximately 40 independent boats and three freezer operations operating in the shrimp industry.

Poland

PREFABRICATED TRAWLERS BUILT: By using new methods Polish shipyards are completing a new fishing vessel every two weeks, states the September 30 issue of The Fishing News, a British fishery periodical. The vessels are being assembled at Gdansk, Poland, from nine prefabricated units (weighing between 90 and 180 tons each) into a completely welded hull.

As many as five trawlers are built at the same time with each one moved from stage to stage on powerful undercarriages. It is estimated that over 50,000 working hours are saved on each vessel by this new process.

Portugal

FISHERIES TRENDS, JUNE 1955: Sardine Fishing: The catch of sardines in Portugal during June 1955 continued good at most fishing ports, reports the September 1955 Conservas De Peixe, a Portuguese trade magazine. Sardine landings in June 1955 totaled 5,197 metric tons, valued at 18.8 million escudos (US$655,000), as compared with landings of 2,193 tons in June 1954. Of the June 1955 catch, 2,654 tons, valued at 8.9 million escudos (US$303,000), were canned.

Other Fishing: The landings of all fish, other than sardines, in June totaled 2,462 metric tons, valued at 8.4 million escudos (US$292,000), mostly chinchards and anchovy, and the balance tuna, mackerel, and bonito.

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MODERN PLANT FOR PRODUCTION OF COD-LIVER OIL: The Portuguese Guild of Codfish Boat Owners has completed construction of a new cod-liver oil plant at Ginjal, Gacilhas, in the municipality of Almada.

Fig. 1 - View of the entrance to the factory. On the right, the administrative building; on the left, the factory--eastern side.

Fig. 2 - View of the warehouse. It shelters metallic storage tanks.

The plant consists of three buildings: (1) the laboratory, offices, and administrative buildings; (2) the manufacturing plant itself; and (3) shelter for storage tanks.

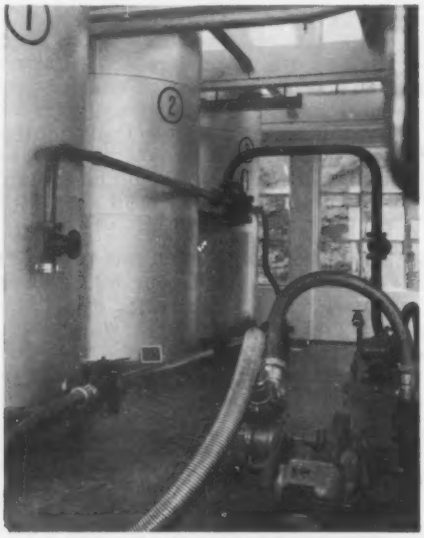

Fig. 3 - Interior of the factory showing operating tanks.

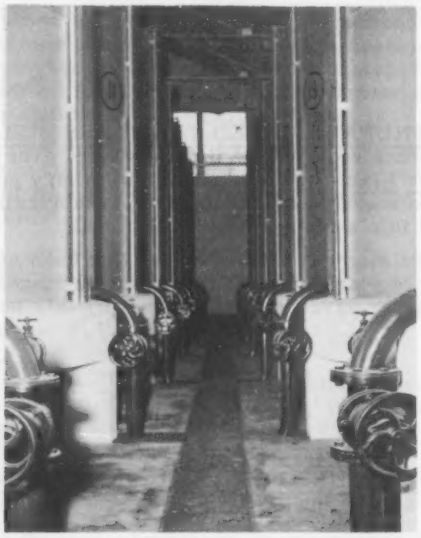

Fig. 4 - Interior of warehouses sheltering the storage tanks.

The productive capacity is about 30 tons of raw material per eight-hour day, varying in accordance with the number of treatments effected. Storage capacity is approximately 1,100 metric tons, according to an August 30 dispatch from the United States Embassy at Lisbon.

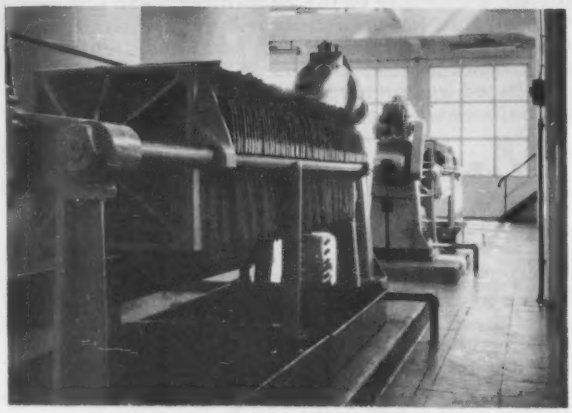

Fig. 5 - Another view of the interior of the factory.

The plant is equipped to neutralize free fatty acids; cleaning and drying; partial deodorization; filtration; and extraction of stearins and other residues. Still more specialized treatments can be effected in the future.

The plant is equipped with a large section for filling, labeling, and packing of the bottles at a high level of production and can process cod-liver oil for any known use, either for human or animal nutrition.

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CANNED FISH EXPORTS, JANUARY-JUNE 1955: Portugal's export of canned fish in June 1955 was good, according to Conservas De Peixe (September 1955). Canned fish exports totaled 4,481 metric tons, valued at 61.5 million escudos (US$2.1 million), during June 1955; and 27,292 tons, valued at 402.3 million escudos (US$14.0 million), during January-June 1955.

Portuguese Canned Fish Exports, January-June 1955

Species	Jan.-June 1955	
	Metric Tons	1,000 US$
Sardines in olive oil	22,105	10,937
Sardinelike fish in olive oil	2,375	1,592
Sardines & sardine-like fish in brine	763	140
Tuna & tunalike in olive oil	923	682
Tuna & tunalike in brine	350	176
Mackerel in olive oil	390	254
Other fish	386	215
Total	27,292	13,996

During January-June 1955 Germany was the leading receiver with 74.4 million escudos (US$2.6 million) of canned fish (principally sardines); followed by Italy with 65.2 million escudos (US$2.3 million), principally sardines; Great Britain with 50.1 million escudos (US$1.7 million), and the United States with 42.6 million escudos (US$1.5 million), principally 998 tons of sardines in oil or sauce, 10 tons of tuna and tunalike fish in oil, and 840 tons of anchovies.

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FISH CANNING TRENDS, APRIL 1955: The Portuguese pack of canned sardines in oil or sauce January to April 1955 amounted to 2,286 metric tons, valued

Portuguese Canned Fish Pack, Jan.-April 1955

Product	Net Weight	Canner's Value		Product	Net Weight	Canner's Value	
	Metric Tons	1,000 Esc.	1,000 US$		Metric Tons	1,000 Esc.	1,000 US$
Sardines in brine	205	927	32	Tuna in brine	2	49	2
Sardines in olive oil or sauce	2,286	37,434	1,302	Tuna in olive oil	59	1,909	66
Sardinelike fish in brine	75	640	22	Tunalike fish in olive oil	69	1,226	43
Sardinelike fish in oil	514	6,818	237	Other species (including shellfish)	458	6,749	235
Anchovies, rolled & fillets	613	18,557	645	Grand Total	4,281	74,309	2,584

(Continued in the Opposite Column)

at 37.4 million escudos (US$1.3 million), according to the September 1955 Conservas De Peixe. Production of all other canned fish for the January-April period amounted to 1,995 tons, valued at 36.9 million escudos (US$1.3 million), and consisted of 205 tons of sardines in brine; 75 tons of sardinelike fish in brine; 514 tons of sardinelike fish in oil; 613 tons of rolled or filleted anchovies; 130 tons of tuna (practically all packed in oil), and 458 tons of miscellaneous species.

Saint Pierre-Miquelon

FISHERIES EXPANSION PLANNED: The French Government has started a ten-year rehabilitation plan for the fisheries at Saint Pierre-Miquelon, according to an October 5 statement by the Governor of the French Islands of Saint Pierre and Miquelon during a visit at St. John's, Newfoundland. As reported by the Daily News of St. John's, the Governor indicated that the Island would change over from the production of only salt fish to the processing of frozen fish. The economy of Saint Pierre is based on the salt-fish industry, and up until a few years ago most of the fishermen went out in small dories and fished, salted their catch, and sent it to France. They have not completely stopped handling salt fish, but now only about half of the men fishing out of Miquelon will salt their fish and the rest will sell their catches fresh to the fish plant in Saint Pierre. By next year it is hoped that all of the fishermen will be selling their fish in the fresh state instead of salted.

Sweden

SHRIMP FISHERY: The only available data on shrimp production in Sweden cover the large shrimp or prawn (Pandalus borealis) fishery. These shrimp are caught outside the Province of Goteborg and Bohus. Small shrimp (Leander adsperus and L. squilla) are also fished in very limited quantities, but these catches are not included in the fishery statistics.

In 1953 there were about 728 fishermen, 1,138 vessels, and 635 trawls used in the shrimp fishery. The value of the trawls used was US$107,000, and the vessels were valued at $495,000. The catch in that year totaled 1,305 metric tons, valued at US$1,083,500 ex-vessel, reports the United States Consulate at Goteborg.

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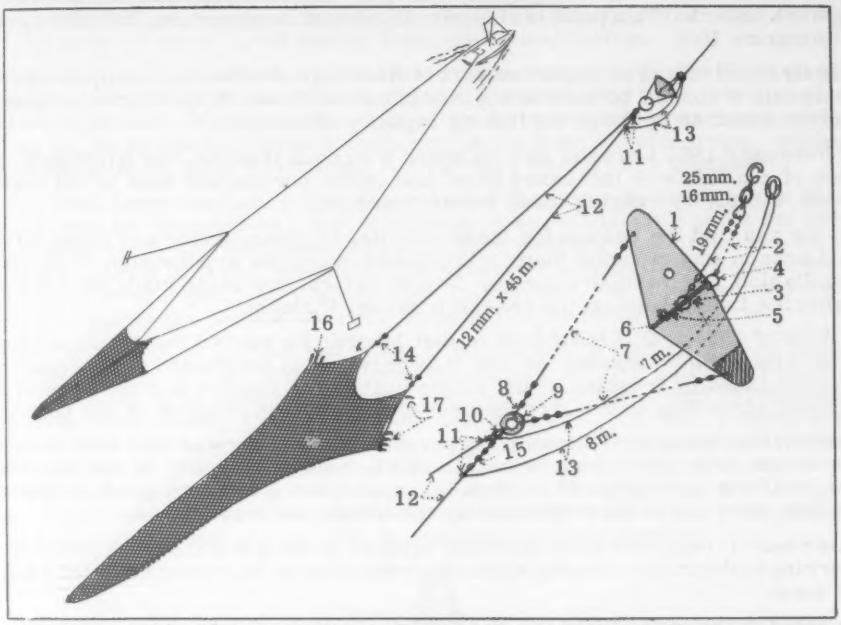
"TRAWL-TOAD" DEVISED FOR MID-WATER TRAWL: A new development (a trawl-toad) designed to give greater efficiency in maintaining the proper setting of the mid-water trawl and enabling it to work closer to the bottom has been announced by Karl-Hugo Larsson, the inventor of the "phantom trawl." Swedish experts have been working for years on evolving a successful floating or mid-water trawl for catching herring in the daytime as an alternative to the well-known drift nets or ring nets customarily used at night when the shoals are near the surface, The Fishing News of July 29 points out.

In the original tests which produced the phantom trawl in 1944, tank tests showed that roughly two-thirds of the resistance of a normal bottom trawl came from the net, the rest from the warps and doors.

The main thing, however, was that it was found possible to design and build trawl doors which could move in the water without touching the sea bed. An ordinary rectangular and flat trawl door is, from a hydrodynamic point of view, of very poor

design as it causes much resistance and noise. To rectify that, Larsson designed a so-called wingdoor with an angle from the direction of motion of less than 15 degrees, and this gave a steady and practically soundless movement. In an ordinary flat trawl door this angle is between 30 and 35 degrees.



(1) Wingdoor with fixed fittings. (2) Chain-bridle, 19 and 16 mm. (3) Harp-shackle, 25 mm. special type. (4) Harp-shackle, 22 mm. special type. (5) Pulling plate. (6) Pulling bolt with leather strap. (7) Pullingchain, 16 mm. x 3 metres. (8) D-shackle, 19 mm. special type. (9) Depth regulating ring. (10) D-shackle, 25 mm. standard. (11) Kelly's eye with stopper. (12) Pulling wire, 12 mm. x 45 metres. (13) Wire for hauling in, 12 mm. x 7 and 8 metres. (14) Swivel, 20 mm. (15) Chain for lengthening pulling wire, 16 mm. x 800 mm. (16) Upper trawl-toad. (17) Lower trawl-toad. (British Patents No. 670222 and 674911; U. S. Patents 24664660 and 2671288).

With the aid of this wingdoor it was found easy to arrange a one-boat net, but it was observed that the glass balls on the net did not do much for the net opening. An 8-inch glass ball, which has a lifting capacity of about 6.6 pounds lying still, rapidly increased its resistance and decreased its lifting capacity when towed with the net.

At a little more than four knots the resistance of each ball was about 13.2 pounds. It was thus necessary to invent some kind of lifting device with better characteristics than the balls.

So the "trawl-toad," of a special shape, was born. Several years and much experimentation have been necessary to get this device just right.

Today a "trawl-toad" 15.7 inches long, weighing 5.5 pounds, increases its shearing capacity according to the square of the speed and at four knots reaches between 26 and 33 pounds. An upper trawl-toad for the headline has to be lighter than water in order to keep clear of the top of the net when shooting. If it is heavier than water it will drag downwards. This means that on a floating trawl "toads" can be used on headlines and foot ropes, thus giving a very good height to the mouth of the net.

A lower trawl-toad has another important feature. Weights hung on the trawl doors slide along the bottom and thus it is possible to drag a net just off the bottom. When the

lower trawl-toads touch the sea bed they no longer function as toads, but hang on as ballast weights, sliding along.

Thus it is possible to catch herring close to the bottom. In such a catch, owing to the position of the net there will be hardly any spawn or small fish, and that factor means less sorting work on deck. This point is also very important as permitting the future growth of the immature fish.

It is stressed that as an important part of the design of a floating trawl, the upper trawl-toad can, of course, be used on any kind of bottom trawl. It would thus increase the height of the mouth and enlarge the fishing capacity of the net.

In February 1955 Larsson was on board a French trawler, the Richelieu, when the catch of coalfish was increased from just under one ton per haul to between 5 and 6 tons, simply by hanging toads on the headline.

To try and find the reason for these results, as given in this and other experiments, Larsson has attended many trials made under the supervision of British, German, Danish, and Swedish experts. Trials, in fact, are being made by the Lowestoft Fisheries Laboratory on the research vessel Platessa.

In June of 1954 I. D. Richardson of that laboratory visited Sweden to witness a series of trials which included the use of both two-boat trawls and single-boat trawls. Photographs taken by frogmen of the single boat trials showed that the catch of small fish differed according to the arrangement of the trawl in relation to the bottom.

Later trials made with German cooperation clearly showed that with phosphorescence in the water very little herring could be caught at night. In the daytime, however, with the herring at 60 to 80 fathoms, catches were very good, confirming that the fish were not at all frightened by the warps and trawl doors.

This result is regarded as most encouraging as proving that it may be possible to catch herring by day rather than by night, which would be an improvement from a social point of view.

To avoid disturbance from the warps when fishing at night, a very simple arrangement has been tried which gave rather good results. By lengthening the lower pulling ropes from the doors to the net and hanging on more weights, or lower trawl toads, the net can be made to move lower than the trawl doors. Thus in most cases the influence from warps will not be very great.

To secure good catches, however, trawling speeds, it is believed, should be increased. This seems to be most important for the best results. It was tried with the Jens Vaever and worked.

It might sound a little fanciful, admits Larsson, but the suggestion is that speed be increased to 5 or 6 knots. This is not possible with ordinary floats on the net. But the toads, with their special shape, can do it. And they have good stability up to 12 knots.

To get high speed one should decrease the size of the net, which will bring down the cost of the gear.

Concluding, Larsson in his notes says, that once practical fishing trials are made with the above-mentioned speeds, he trusts that all pelagic trawling problems will be fully solved and that this new method will be adopted as being good and reliable.

Thailand

NYLON GILL NETS PROVE SUCCESSFUL: The gill net is used widely in the fisheries of Thailand and supply high-priced species for the fresh fish markets, according to a November 4 report from the United States Foreigh Operations Mission to Thailand (FOAMT). These nets, in the past, have been woven by the fishermen from natural

fibers--cotton, hemp, or linen, and require a great deal of attention. They must be dried carefully, tanned often, and mended frequently, resulting in as much time spent on shore to keep them in condition as for fishing.

Information that synthetic fiber nets were being used successfully in other countries led FOAMT, in cooperation with the Thai Department of fisheries, to import 50 nylon gill nets, or about 1,640 yards, from the United States.

Tests were devised and carried out for two seasons at the Marine Fisheries Station near Rayong. The tests showed that the nylon gill nets caught 2 to 3 times more fish than the native-type nets. It was also established that a great deal less work was necessary in caring for the nylon nets--repair costs were much less; careful drying, tanning, and mending needs were largely obviated; fishing time was greatly increased.

The Thai fishermen when they had heard of the new nets came to the Marine Station to see for themselves. And they became so enthusiastic about the nylon nets that the Director of the Station could easily have sold his experimental nets at a good profit. Since this was impossible he arranged with an import concern to bring similar nets from Japan. On their arrival in Thailand, the Japanese nets sold very quickly and within the past few months some 300 were being fished.

Even in this short period, the effect of the improved fishing method is striking. At one tiny fishing village, which adjoins the Marine Station, additional income derived from using nylon nets has already resulted in six fishermen earning enough to motorize their boats. In two cases the new nets were paid for in three weeks of fishing. There is every reason to believe that the use of nylon nets will spread soon to every region in Thailand and consequent greater productivity and income will enable small fishermen to acquire motors and better tools for their work. Not only are the fishermen benefited but also the consumer because fish are reaching markets at lower prices and this in turn is opening a greater market.

Turkey

SHRIMP FISHERY: Turkey's shrimp production is estimated at about 30 to 50 metric tons a year, with spring and autumn the most productive seasons. The sizes range from 15 to 50 count heads-on deveined raw white shrimp a pound. Iskenderun, Ismir, and Istanbul are the principal centers for the shrimp fishery. In the Iskenderun area there are 12 trawl boats ranging from 25 to 30 tons in capacity, small shrimp processing plants, and two freezing plants, according to a United States Embassy dispatch from that country.

At present shrimp are deveined, packaged, and frozen. The product is marketed locally and some shipped to the United States.

Turkish local prices for shrimp are higher than United States prices. Shrimp exports are subject to an export premium in order to bring Turkish prices down to the United States price level.

United Kingdom

DISTANT TRAWLERS INCREASE CATCH, JANUARY-JUNE 1955: British distant water trawlers landed over 25¼ million pounds more fish in the first six months of this year than in the same period of last year. Despite higher operating costs and fishermen's increased earnings the price of fish remained unchanged and the time taken on voyages was cut by a day.

These are among the achievements of the British fishing industry stressed in the report of the British Trawlers' Federation (B.T.F.) for the first six months of this year, according to Trade News (a British fishery publication) of September 1955.

The average catch jumped by 14 percent as compared with the first six months of 1954. In June the catch per day at sea went up by 20 percent over the June 1954 average. In January, the month in which two big ships were lost, Lorella and Roderico, the catch per ship increased by over 23 percent. This spectacular increase in efficiency has enabled the industry to absorb increasing costs of fuel and other commodities without increasing the unit cost of production.

Faster and bigger ships, and greater competition among crews has cut the time taken on voyages from 21 days last year to 20 days at present. New vessels were continually joining the fleet as older ones were taken out of commission.

Over-all landings increased by 6.1 percent. Consumption went up also--4.1 million pounds more was eaten this year, an increase of 1.1 percent. The remaining five percent of the bigger landings during the six months was left unsold. At Hull and Grimsby in June, for instance, 14.2 million pounds of fish did not find a buyer. This was due to the warmer weather and to the fact that fish friers, the industry's largest customers, had difficulty in getting potato supplies and cut their fish orders as a result.

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CHANGE OF OPINION ON NORTH SEA HERRING STOCKS: Twenty years ago Dr. W. Hodgson, head of the research section of the Fisheries Laboratory at Lowestoft, believed that the herring stocks of the sea were inexhaustible. Now he has drastically changed his mind and he believes that the herring shoals are being tremendously depleted by European Continental vessels trawling for herring.

"It will surprise me," says Dr. Hodgson, "if there are a large number of fish on the East Anglian grounds this season," the October 10 issue of The Fishing News reports.

"There has been a steady decrease in the number of four-year-old herring on the East Anglian grounds since 1950," he goes on. "There is every reason to believe that this is coupled with the enormous increase in European Continental trawling for immature fish in their second year.

"This trawling is carried on solely with the aim of turning the fish into meal and oil.

"The Danes trawl for herring during two seasons of the year. From January to April and from July to October. Then in December, in the English Channel, the great spawning grounds of the herring, as many as 150 German and French trawlers are working among the mature fish, again taking fish primarily for meal and oil."

Dr. Hodgson said that in 1953 something like 80,000 metric tons of immature fish were taken from the North Sea. They were in their second year and probably numbered 4,000 to the cran (392-pound unit of weight).

"This adds up to an astronomical figure of some 1,600 million immature herring taken in one year," he said.

Dr. Hodgson recalled that it was in 1951 that the forecast which he had been making of the East Anglian fishing since 1929 first went wrong.

"In that year of 1951, the peak at the October moon failed, and at the same time the herring suddenly increased in size. In 1950 the proportion of four to five-year-old herring was as forecast, but the following year they were very much reduced.

"Up to that time," said Dr. Hodgson, "four-year-olds in the shoals were always about $2\frac{1}{2}$ times as numerous as the three-year-olds of the previous year. That sounded complicated, but the explanation was that the three-year-olds which migrated into East Anglian waters from the central North Sea were mature.

"In fact, there were many more three-year-olds every year which were not mature, and which did not come to our waters. They came, however, as four-year-olds the next year."

The greatly reduced number of four-year-olds which upset his 1951 forecast was his first indication that something which had not been met with before was interfering and causing the reduction in the size of the shoals. It was clear that forecasting was no longer practicable.

Dr. Hodgson added that one very clear consequence of the overfishing of the immature herring was that over the last 3 or 4 autumn seasons there had been an increasing drop in the number of four-year-olds which came to East Anglia.

"That is still going on and the general effect has been that the bulk of the fish in recent years have been three-year-olds. If the older fish are to become extinct or very scarce indeed, it follows that the November fishing will be very light, because there will be few of the older type of herring that can turn up."

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DOGFISH DEMAND GOOD: A steady but almost imperceptible increase in the demand for dogfish during the years since World War II has now resulted in a prolonged season with two very well-defined peak periods, according to the Fishing News, a British fishery magazine.

A few years ago, the dogfish season was a short one, but now fishermen, notably at Grimsby, are looking for new grounds and keeping up with the fish almost year-round.

Though considerable quantities of dogfish are landed at Fleetwood, some idea of the increased importance of this fishing to Grimsby may be obtained from the fact that in May 1955 2.4 million pounds of a total nationwide catch of 3 million pounds were landed there.

Figures for 1955 show that in April 1.6 million pounds out of a total of 2.5 million pounds were landed at Grimsby, but from January-March, the bulk of the catch was marketed at Fleetwood.

The big increase in demand, which has become more marked this year, may be traced largely to London and the Home Counties where the taste for dogfish has grown steadily. One of the reasons for this may be that during the war many fish friers used dogfish when supplies of other fish were scarce, and so a preference for dogfish to cod, haddock, or skate has been developed.

A few years ago fishermen concentrated on fishing for dogfish in the late spring and early summer only. Now, several Grimsby trawler firms are taking them as long as they can. Small inshore line-fishing vessels have done quite a lot to keep this season open.

The demand from London and the surrounding district is so steady that merchants dealing in dogfish can buy during peak periods and quick-freeze against the time of lighter supplies. For a number of years, the British wholesale trade has had to import considerable quantities of high-quality Norwegian dogfish, fresh and skinned, to keep the supplies up for their quick-freezing.

The January-August 1955 catch totaled 14.3 million pounds, valued at £244,353 (US$648,188), making a worthwhile contribution to British fish landings.

Prospects for an even bigger demand for the once despised dogfish are good, and the wholesale trade is encouraging its marketing potentialities.

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LIVE SHELLFISH PACKED WITH ICE BAGS: A Billingsgate, London, fish firm now uses ice bags made from polythene film to ensure that fresh, healthy, and above all, dry lobster and crabs reach their markets on the European continent.

The new method overcomes the danger and inconvenience which results from the use of free ice in the containers. Especially in warm weather, the live shellfish come into contact with a considerable amount of fresh water from the melting ice which spoils their flavor. The waterproof bag now in use is better than the absorbent sawdust formerly used.

The polythene film is supplied in the form of a lay-flat tube and is cut to the required length, heat-sealed at one end, filled with water, and then completely heat-sealed. The bags of water are placed in refrigerators and frozen solid. When consignments are being packed for export, a layer of ice bags is placed in the carton and the lobsters and crabs are placed on this and padded with wood wool. The properties of polythene film make it especially suitable for this purpose, for it is flexible at low temperatures, tough, durable, and waterproof. When the ice melts, the water is retained entirely in the waterproof film bags.

Extra life is also given to the cardboard cartons. Formerly, damp conditions inside reduced their handling strength and air companies, in particular, were reluctant to handle them.

Polythene, in 5-inch and 9-inch tube widths, is used and the bags are about 15 inches in length. The British firm reports favorable comments on the new method of packaging from their clients and those who handle and transhipp the containers.

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TRAWLERMEN SEEK HIGHER SHARES: British trawlermen presented their case for increased poundage or share rates to the Joint Industrial Council for the Fishing Industry at a meeting that opened in London on September 30, according to The Fishing News, a British fishery periodical. Poundage or share rates have remained unchanged since 1946 and the cost of living has increased materially.

In addition to the base pay, ratings such as deckhands, cooks, and second engineers receive a percentage of the gross stock, which amounts to £6 (US$16.80) for each £1,000 (US$2,800) of the stock. Other ratings are paid a pro rata share. The shares for captains and first mates are based on a percentage of the net stock or what remains after the usual expenses of the trip are deducted.

At the present time basic wages and percentages of the gross stock paid to the crew members other than the captains and first mates are taken into account in settling the trip. Any increases made to the crew members will mean lower shares

for the officers whose share comes from the net stock. Unless some adjustment is made in the present system of payment, captains and first mates will receive less money.

Involved in the meeting with the Joint Council are representatives of the fishermen's union, the Trawler Officers' Guild, and the trawler owners.

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BRITISH AND NORWEGIAN WHALING FLEET WAGE DISPUTE: Wage negotiations in London covering Norwegian crews on Norwegian and British whaling ships ended unsuccessfully. The Norwegian sailors' and officers' unions brought the issue before the State Mediator; this officer has been unable to frame acceptable proposals for any of the three categories of seamen involved, i. e., crew, engineering officers, and deck officers. Crews usually sign on for the coming season by September 15, but the wage dispute blocked this.

If the State Mediator is unable to come up with an acceptable proposal, there is a good possibility that this dispute will be subject to compulsory arbitration. The unions would protest such a move, but in view of the importance of the industry to the economic position of the country, the pressure for compulsory arbitration would be great.

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NEW FISHING GROUND FOR OCEAN PERCH YIELDS HEAVY CATCHES: German trawler skippers discovered a new fishing ground between Iceland and Greenland, and about 160 miles off the Icelandic coast. As a result, they have been landing phenomenal catches of ocean perch at Grimsby during the last few weeks, The Fishing News, a British fishery periodical of October 7 announced.

One vessel, which recently caught between 3,500 and 4,000 kits (490,000-590,000 pounds) of fish in five days, landed its trip at Grimsby and received a good price on the market.

Agents for the bulk of the German trawlers landing at Grimsby said, "That particular ground was discovered by the Germans and catches, exclusively of reds, have certainly been very heavy from it.

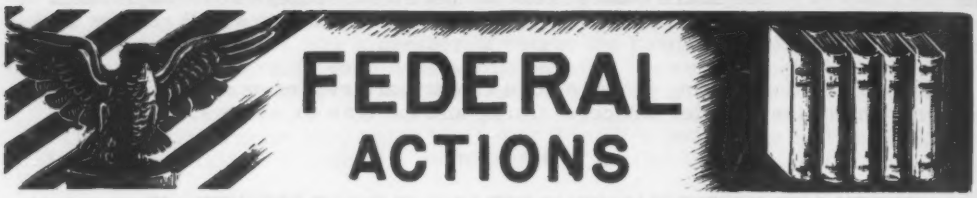
"That part of the sea is usually icebound at this time of the year, but it is still free from ice. There seems to be no limit to its prospects providing the ice keeps off."

HIGH-PRICED SHARK

South Sea Islands fishermen find it difficult to believe that ordinary school shark--the kind that grows to about five feet in length--was selling in the Sydney, Australia, fish markets at 4s. 6d. (50 U. S. cents) per pound in October 1954, while imported Danish flounder fillets were retailing at 4s. (44 U. S. cents) per pound.

This looks like an opportunity for an Islands shark-meat export trade, but it isn't. All Australian imports of shark are rigidly controlled to keep the price at or about 4s. 6d. (50 U. S. cents) per pound.

--Pacific Islands Monthly, November 1954



Department of the Interior

FISH AND WILDLIFE SERVICE

TWO ASSISTANT DIRECTORS NAMED FOR FISH AND WILDLIFE SERVICE:

Appointment of two Assistant Directors for the Fish and Wildlife Service was announced today by the Acting Secretary of the Interior.

Robert H. Johnson, presently Director of the Division of Fish and Game of the State of Massachusetts, has been named Assistant Director for Wildlife, a post long vacant.

Lester Bagley, Wyoming State Game and Fish Commissioner, has been appointed Assistant Director for Field Operations. He succeeds Ernest F. Swift who resigned in August.

In announcing the appointments, Acting Secretary Fred Aandahl said:

"Conservation and development of the Nation's fish and wildlife resources are a major responsibility of the Department of the Interior. The Department has initiated a number of long-range programs designed to assure wise use of these resources while affording them full protection for the future.

"The appointment of the two new Assistant Directors of the Fish and Wildlife Service--one from the Rocky Mountain region and one from the East Coast--will strengthen our vital conservation programs and give them impetus. Both men are highly experienced in this field."

A native of Massachusetts, Johnson has held his post there since February of 1948. For three years prior to that time he was a wildlife project leader for the Massachusetts Fish and Game Division. His earlier experience in this field was as a wildlife technician for the State of Maine, prior to which he spent two years as a forestry foreman in New Hampshire for the United States Forest Service.

Johnson was educated at the University of Idaho and the University of Maine. He has a bachelor of science degree in forestry and a master of science degree in wildlife management. He is a member of the International Association of Game, Fish, and Conservation Commissioners.

Bagley's career in fish and wildlife work dates from 1919, when he became a Deputy Game Warden in Wyoming. He was State Game Warden from 1938 until 1944, and has been State Game and Fish Commissioner since the latter year. He was born in Idaho, and taught school in northwestern Wyoming before starting work in his present field.

Bagley studied education and engineering in Idaho and Utah, at the Fielding Academy in Idaho, and at Brigham Young and Utah State in Utah. He was in the Army Air Corps during World War I.

In addition to his position as Game and Fish Commissioner, Bagley also is a member of the Wyoming State Resources and Planning Board, the Water Pollution Board, and the State Park Board. He is a member of the Wildlife Society, the American Fisheries Society, the International Association of Game, Fish and Conservation Commissioners, the Western Association of State Game and Fish Commissioners, and the National Wildlife Federation.

Bagley was President of the Western Association of State Game and Fish Commissioners in 1942 and 1955, and of the International Association of Game, Fish and Conservation Commissioners in 1947.

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NEW ASSISTANT TO FISH AND WILDLIFE DIRECTOR NAMED:

Secretary of the Interior Douglas McKay announced November 16 the appointment of Robert A. Wells, former secretary of the New York State Department of Conservation, as assistant to the director of the Fish and Wildlife Service.

A newspaperman and conservation writer for 20 years before joining the New York Department of Conservation in 1946, Wells will advise and assist the Fish and Wildlife Service director in many phases of the activities necessary to a progressive program of fish and game development and conservation, Secretary McKay said.

Wells joined the staff of the Watertown, N. Y., Daily Times in 1926, and later became State editor of that newspaper.

He was one of the organizers of the Northeastern Waterfowl Association, which has been credited with effective work in the preservation of waterfowl in the Lake Ontario-St. Lawrence River region, Secretary McKay commented.

As secretary of the New York State agency, Wells was identified with a conservation organization regarded as one of the Nation's outstanding groups in this field. His duties with the State agency embraced all phases of conservation activity.

Department of State

UNITED STATES TO PARTICIPATE IN TENTH SESSION OF THE CONTRACTING PARTIES TO GATT:

The United States participated in the Tenth Session of the Contracting Parties to the General Agreement on Tariffs and Trade (the GATT) which began October 27 in Geneva, Switzerland, an October 20 news release from the U. S. Department of State reports.

The Tenth Session was expected to last about five weeks. There were consultations about the discriminatory import restrictions of five countries, the United Kingdom, Ceylon, Australia, New Zealand, and the Federation of Rhodesia and Nyasaland. The consultations included a broad examination of (1) the impact on trade of the restrictions in question and (2) the basis for their retention. During this review, the United States Delegation will have the opportunity to seek information regarding the operation of the import controls of these countries and to press for relaxation of those which appear to be unduly or unnecessarily severe.

The United States Delegation also intends to hold informal talks with the delegations of several other countries with a view to securing a relaxation of certain of their import controls adversely affecting American products.

Procedures are expected to be discussed for the next round of tariff negotiations among the GATT countries starting at Geneva in January. These procedures are expected to be substantially the same as those used during the previous tariff negotiations at Geneva, Annecy, and Torquay.

The Tenth Session is marked by the participation for the first time of Japan as a contracting party to the General Agreement. Japan's participation during the last two sessions was on a provisional basis. Adherence by Japan was voted by the GATT countries during the summer and became effective on September 10, 1955.

Eighty-Fourth Congress (First Session)

Listed below are public bills and resolutions introduced and referred to committees or passed by the Eighty-Fourth Congress (First Session) and signed by the President that directly or indirectly affect the fisheries and allied industries.

Public bills and resolutions are shown in this section when introduced and, if passed, when signed by the President; but also shown from month to month are the more pertinent reports, hearings, or chamber actions on some bills.

RADIATION STERILIZATION OF FOODS: (Hearing Before the Subcommittee on Research and Development of the Joint Committee on Atomic Energy), May 9, 1955, 84th Congress, 1st Session, 62 pp., printed. Contains biographical sketches of witnesses, statements by various Federal officials, and a list of exhibits. Among the many subjects discussed in the report with reference to the radiation sterilization of foods are chemical reactions in irradiated food, prospects for future, irradiation costs, nonsterilizing radiation applications on food, radiation of frozen food, extension of refrigerated shelf life, test diet on human beings, and vitamin loss.

SPERMACETTI FROM THE WHALE'S HEAD

Spermacetti is the commercial name for the clear oil found within an immense bag or "case" in the front of a sperm whale's head. When whalers make an incision in this bag (known as "tapping the case"), the oil pours forth and in contact with the air solidifies into a soft white wax. One whale may yield as much as 15 barrels of spermacetti oil. The substance is used in making candles, in the dressing of fabrics, for medicinal purposes, cosmetics, etc. The function of the "case" is not known, but it is believed to aid in lending buoyancy to the whale, as well as to press tightly against the nostrils and so close them when the sperm whale dives to great depths in search of squid, its natural food. Usually the left nostril only is functional in the sperm whale, the right nostril passage being diverted under and around the spermacetti "case" and joining the left just below the single, off-center blowhole.

--Sea Secrets, July 20, 1954,
The Marine Laboratory,
University of Miami,
Coral Gables, Fla.

Editorial Assistant--Ruth V. Keefe Illustrator--Gustaf T. Sundstrom

Compositors--Jean Zalevsky, Alma Greene, and Helen Joswick

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Photograph Credits: Photographs on pages not mentioned were obtained from the Service's file and the photographers are unknown.

Cover--Fred W. Hipkins

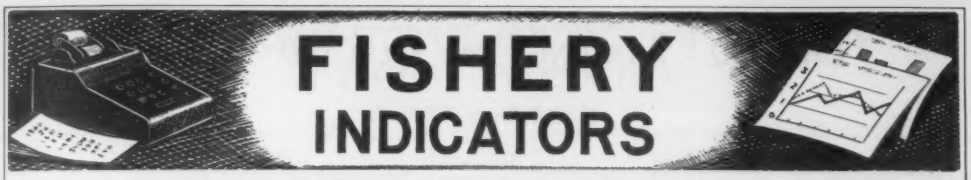
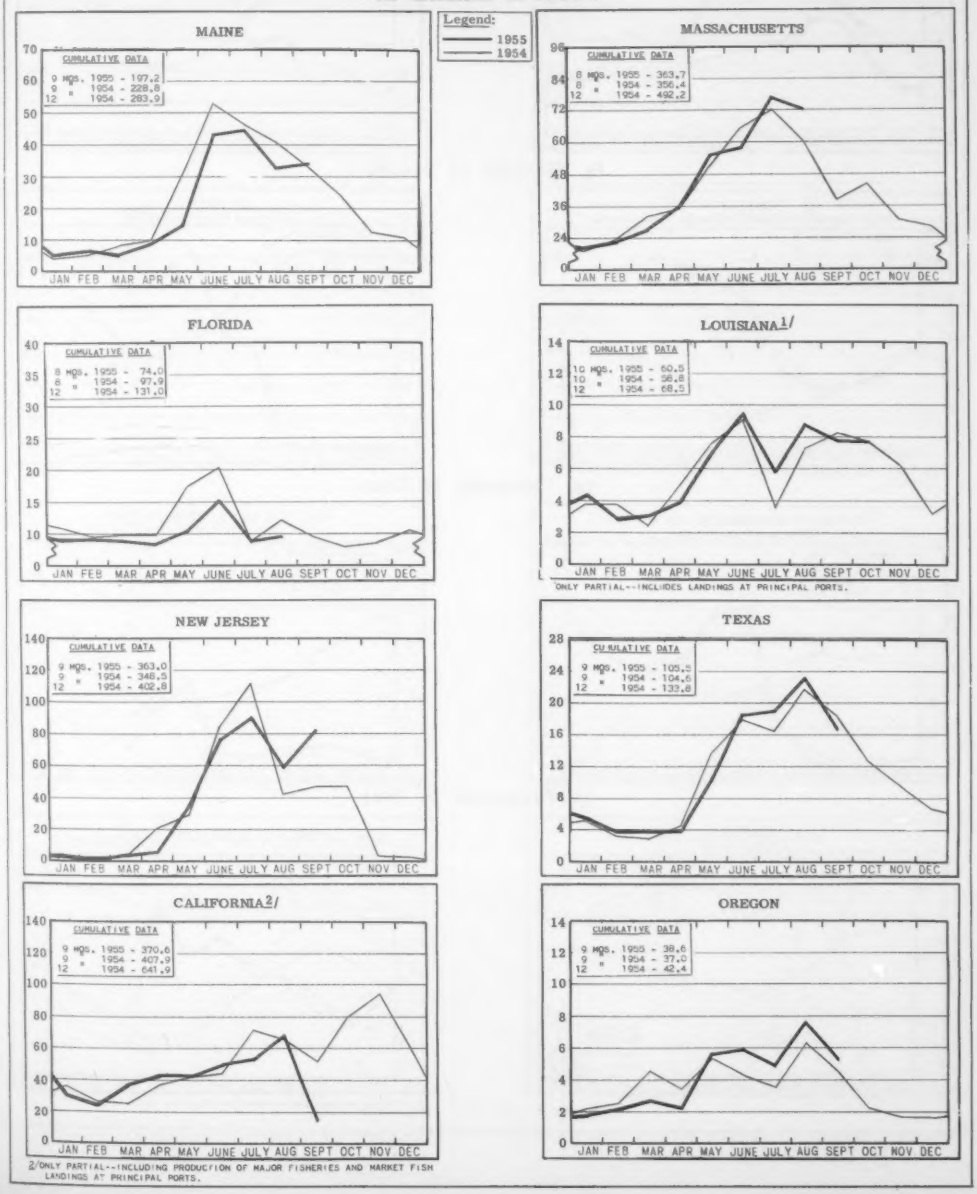


CHART 1 - FISHERY LANDINGS for SELECTED STATES

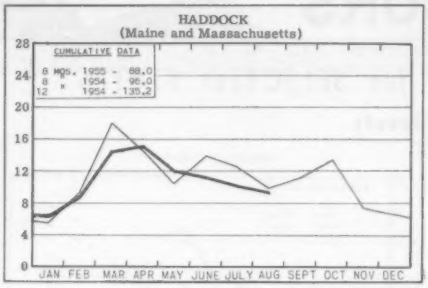
In Millions of Pounds



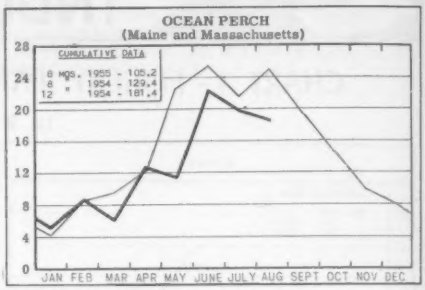
2/ONLY PARTIAL--INCLUDING PRODUCTION OF MAJOR FISHERIES AND MARKET FISH LANDINGS AT PRINCIPAL PORTS.

CHART 2 - LANDINGS for SELECTED FISHERIES

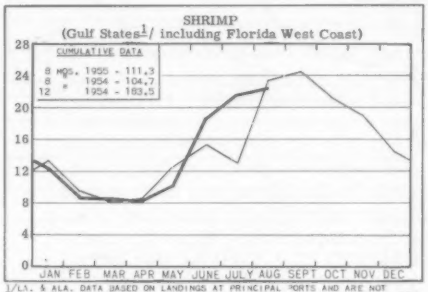
In Millions of Pounds


HADDOCK
(Maine and Massachusetts)
CUMULATIVE DATA
6 MOS. 1955 - 88.0
6 " 1954 - 96.0
12 " 1954 - 135.2
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

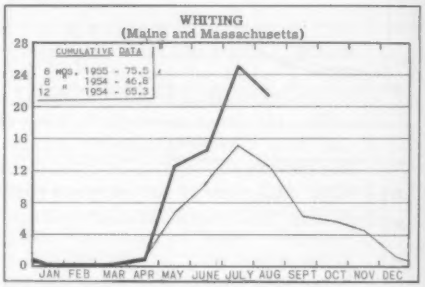
Legend:
1955
1954


OCEAN PERCH
(Maine and Massachusetts)
CUMULATIVE DATA
6 MOS. 1955 - 105.2
6 " 1954 - 129.4
12 " 1954 - 181.4
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

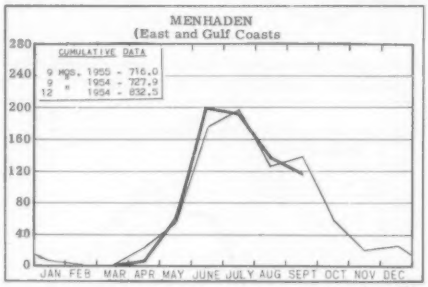
In Millions of Pounds

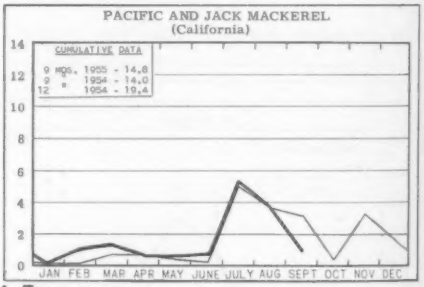

SHRIMP
(Gulf States 1/ including Florida West Coast)
CUMULATIVE DATA
6 MOS. 1955 - 111.3
6 " 1954 - 104.7
12 " 1954 - 183.5
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

1/ LA. & ALA. DATA BASED ON LANDINGS AT PRINCIPAL PORTS AND ARE NOT COMPLETE.

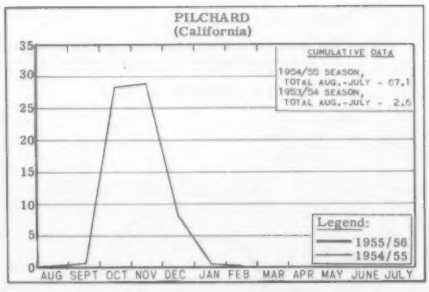

WHITING
(Maine and Massachusetts)
CUMULATIVE DATA
6 MOS. 1955 - 75.8
6 " 1954 - 40.8
12 " 1954 - 65.3
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

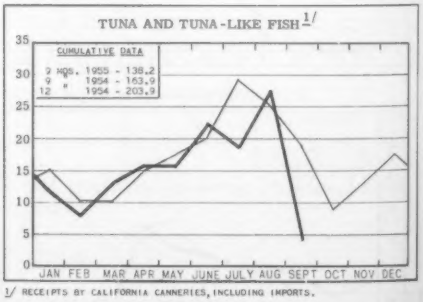
In Thousands of Tons


MENHADEN
(East and Gulf Coasts
CUMULATIVE DATA
9 MOS. 1955 - 716.0
9 " 1954 - 727.9
12 " 1954 - 832.5
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC


PACIFIC AND JACK MACKEREL
(California)
CUMULATIVE DATA
9 MOS. 1955 - 14.8
9 " 1954 - 14.0
12 " 1954 - 19.4
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

In Thousands of Tons

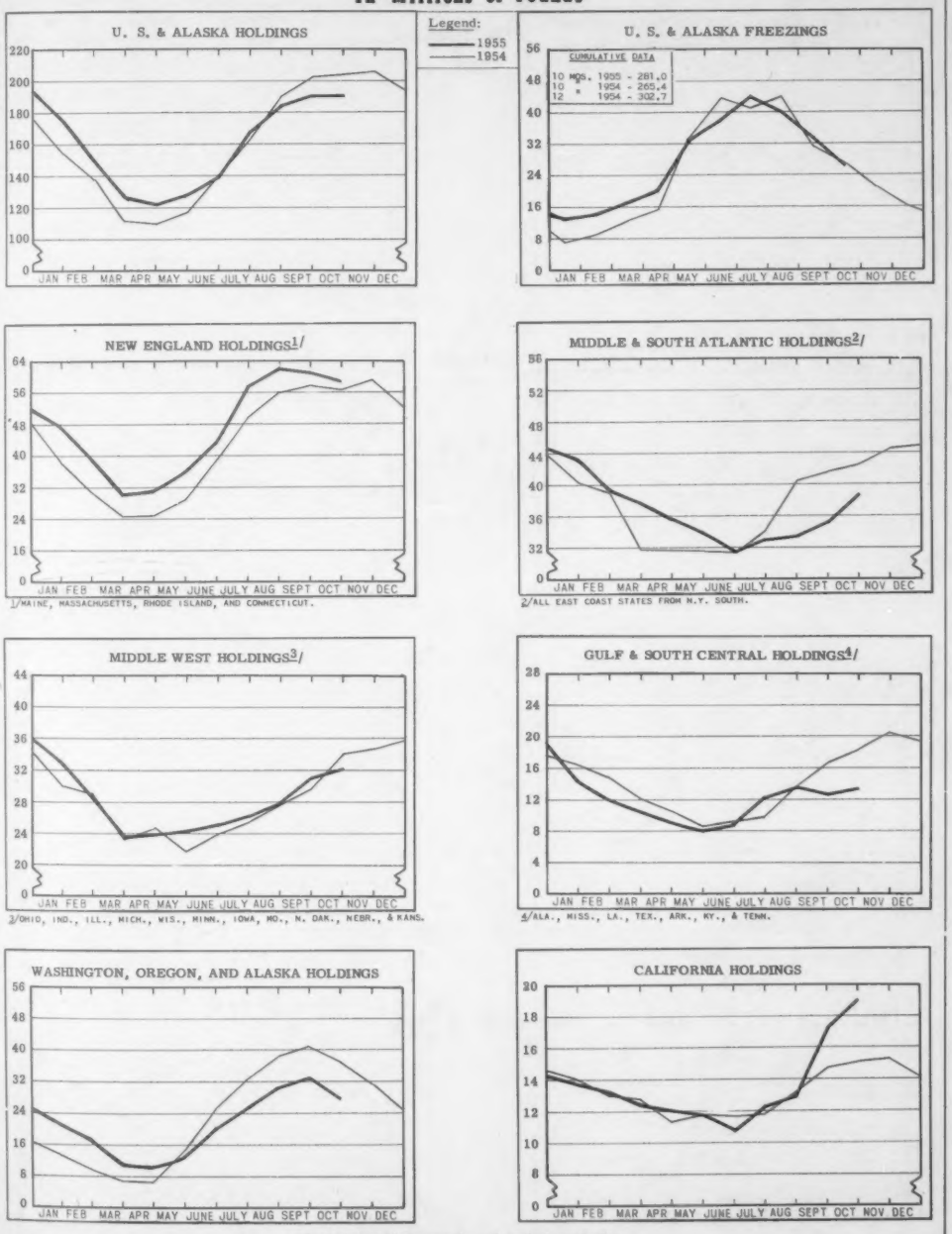



TUNA AND TUNA-LIKE FISH 1/
CUMULATIVE DATA
9 MOS. 1955 - 138.2
9 " 1954 - 163.9
12 " 1954 - 203.9
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

1/ RECEIPTS BY CALIFORNIA CANNERIES, INCLUDING IMPORTS.

CHART 3 - COLD-STORAGE HOLDINGS and FREEZINGS of FISHERY PRODUCTS *

In Millions of Pounds


U. S. & ALASKA HOLDINGS
Legend:
1955
1954
U. S. & ALASKA FREEZINGS
CUMULATIVE DATA
10 MOS. 1955 - 281.0
10 " 1954 - 265.4
12 " 1954 - 302.7
NEW ENGLAND HOLDINGS1/
MIDDLE & SOUTH ATLANTIC HOLDINGS2/
MIDDLE WEST HOLDINGS3/
GULF & SOUTH CENTRAL HOLDINGS4/
WASHINGTON, OREGON, AND ALASKA HOLDINGS
CALIFORNIA HOLDINGS
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

1/MAINE, MASSACHUSETTS, RHODE ISLAND, AND CONNECTICUT.

2/ALL EAST COAST STATES FROM N.Y. SOUTH.

3/OHIO, IND., ILL., MICH., WIS., MINN., IOWA, MO., N. DAK., NEBR., & KANS.

4/ALA., MISS., LA., TEX., ARK., KY., & TENN.

*Excludes salted, cured, and smoked products.

CHART 4 - RECEIPTS and COLD-STORAGE HOLDINGS of FISHERY PRODUCTS at PRINCIPAL DISTRIBUTION CENTERS

In Millions of Pound

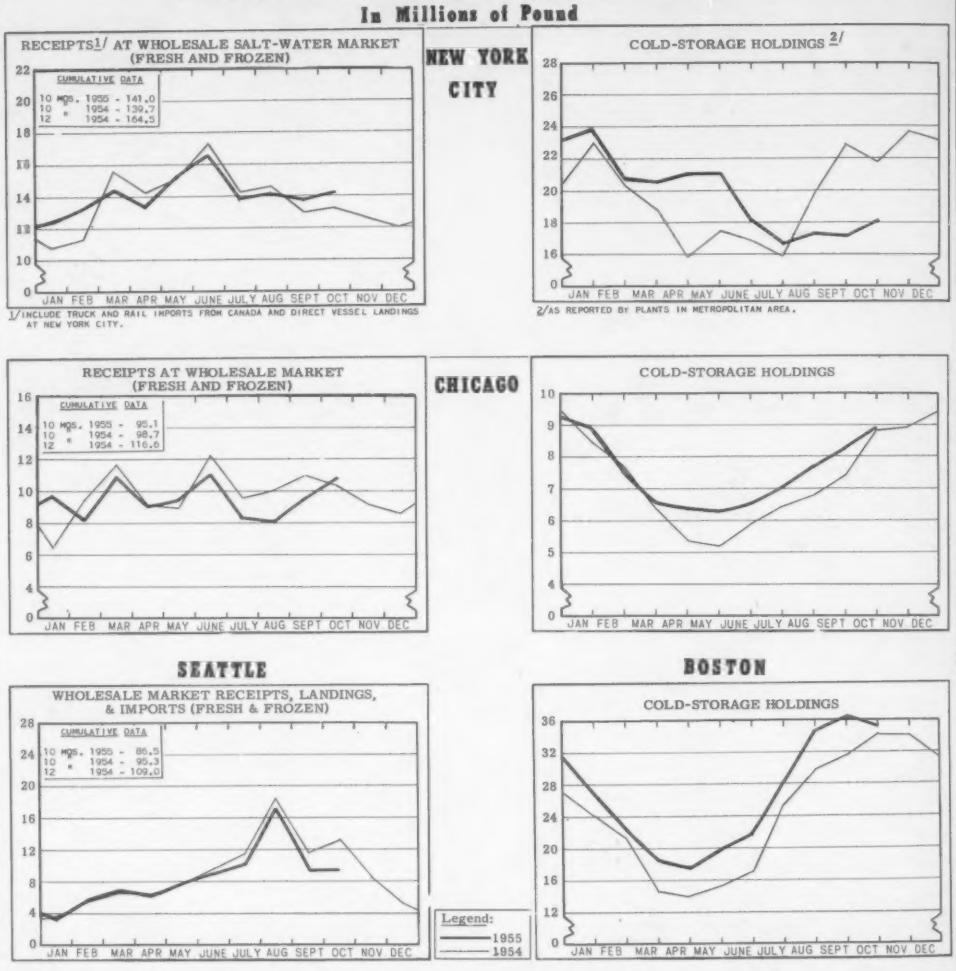

RECEIPTS1/ AT WHOLESALE SALT-WATER MARKET (FRESH AND FROZEN)
CUMULATIVE DATA
10 MOS. 1955 - 141.0
10 " 1954 - 139.7
12 " 1954 - 164.5
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC
1/INCLUDE TRUCK AND RAIL IMPORTS FROM CANADA AND DIRECT VESSEL LANDINGS AT NEW YORK CITY.
NEW YORK CITY
COLD-STORAGE HOLDINGS 2/
2/AS REPORTED BY PLANTS IN METROPOLITAN AREA.
RECEIPTS AT WHOLESALE MARKET (FRESH AND FROZEN)
CUMULATIVE DATA
10 MOS. 1955 - 93.1
10 " 1954 - 98.7
12 " 1954 - 116.6
CHICAGO
COLD-STORAGE HOLDINGS
SEATTLE
WHOLESALE MARKET RECEIPTS, LANDINGS, & IMPORTS (FRESH & FROZEN)
CUMULATIVE DATA
10 MOS. 1955 - 86.5
10 " 1954 - 99.3
12 " 1954 - 109.0
Legend:
1955
1954
BOSTON
COLD-STORAGE HOLDINGS

CHART 5 - FISH MEAL and OIL PRODUCTION - U.S and ALASKA

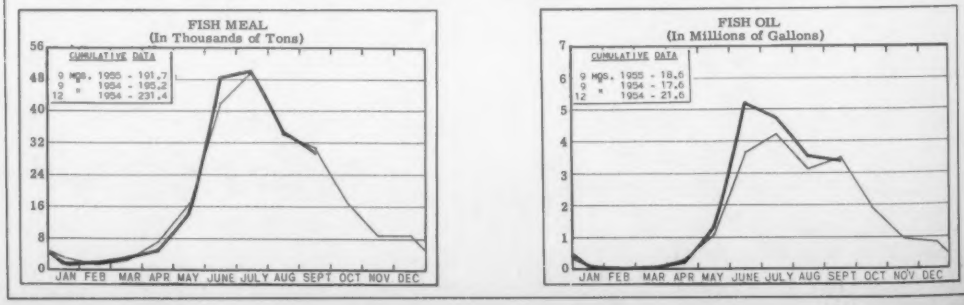
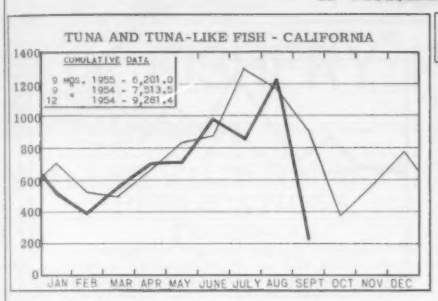
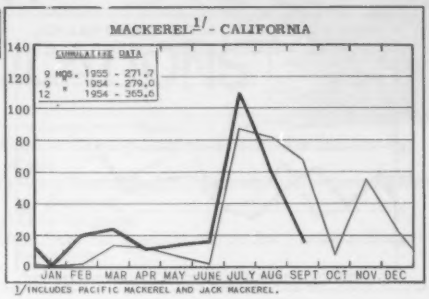

FISH MEAL
(In Thousands of Tons)
CUMULATIVE DATA
9 MOS. 1955 - 191.7
9 " 1954 - 195.2
12 " 1954 - 231.4
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC
FISH OIL
(In Millions of Gallons)
CUMULATIVE DATA
9 MOS. 1955 - 18.6
9 " 1954 - 17.6
12 " 1954 - 21.6
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

CHART 6 - CANNED PACKS of SELECTED FISHERY PRODUCTS

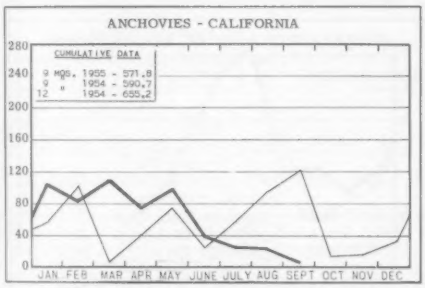
In Thousands of Standard Cases

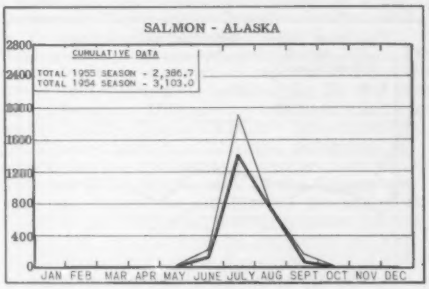


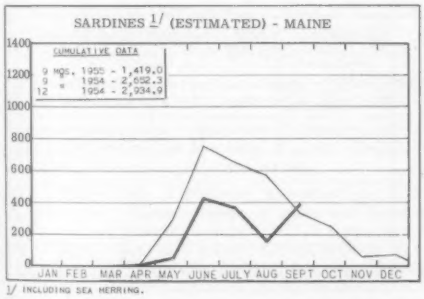
Legend:
1955
1954



1/ INCLUDES PACIFIC MACKEREL AND JACK MACKEREL.



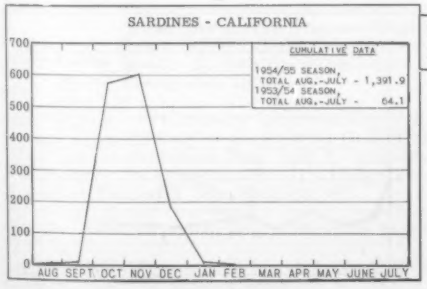




1/ INCLUDING SEA HERRING.

STANDARD CASES

Variety	No. Cans	Can Designation	Net Wgt.
SARDINES	100	¼ drawn	3¾ oz.
SHRIMP.....	48	--	5 oz.
TUNA	48	No. ½ tuna	6 & 7 oz.
PILCHARDS	48	No. 1 oval	15 oz.
SALMON	48	1-pound tall	16 oz.
ANCHOVIES	48	½ lb.	8 oz.



Legend:
1955/56
1954/55

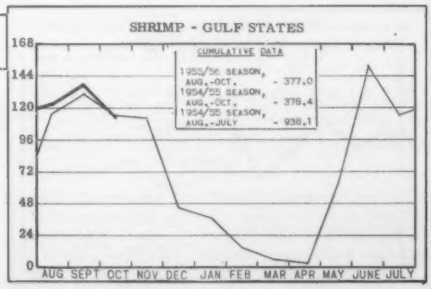
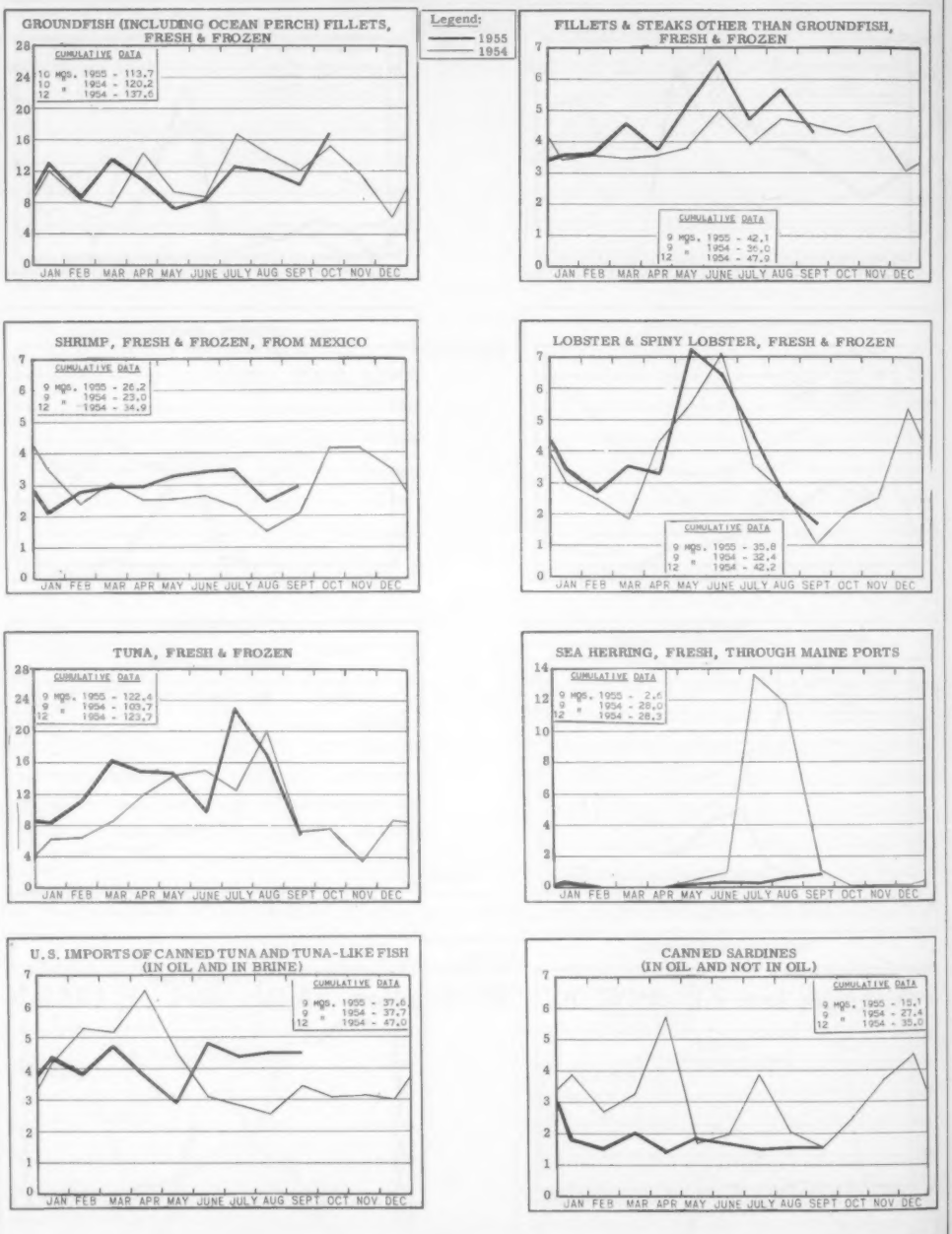


CHART 7 - U.S. FISHERY PRODUCTS IMPORTS

In Millions of Pounds


GROUNDFISH (INCLUDING OCEAN PERCH) FILLETS, FRESH & FROZEN
CUMULATIVE DATA
10 MOS. 1955 - 113.7
10 " 1954 - 120.2
12 " 1954 - 137.6
Legend:
1955
1954
FILLETS & STEAKS OTHER THAN GROUNDFISH, FRESH & FROZEN
CUMULATIVE DATA
9 MOS. 1955 - 42.1
9 " 1954 - 36.0
12 " 1954 - 47.9
SHRIMP, FRESH & FROZEN, FROM MEXICO
CUMULATIVE DATA
9 MOS. 1955 - 26.2
9 " 1954 - 23.0
12 " 1954 - 34.9
LOBSTER & SPINY LOBSTER, FRESH & FROZEN
CUMULATIVE DATA
9 MOS. 1955 - 35.8
9 " 1954 - 32.4
12 " 1954 - 42.2
TUNA, FRESH & FROZEN
CUMULATIVE DATA
9 MOS. 1955 - 122.4
9 " 1954 - 103.7
12 " 1954 - 123.7
SEA HERRING, FRESH, THROUGH MAINE PORTS
CUMULATIVE DATA
9 MOS. 1955 - 2.6
9 " 1954 - 28.0
12 " 1954 - 28.3
U.S. IMPORTS OF CANNED TUNA AND TUNA-LIKE FISH (IN OIL AND IN BRINE)
CUMULATIVE DATA
9 MOS. 1955 - 37.6
9 " 1954 - 37.7
12 " 1954 - 47.0
CANNED SARDINES (IN OIL AND NOT IN OIL)
CUMULATIVE DATA
9 MOS. 1955 - 15.1
9 " 1954 - 27.4
12 " 1954 - 35.0
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

FISH AND WILDLIFE SERVICE PUBLICATIONS

THESE PROCESSED PUBLICATIONS ARE AVAILABLE FREE FROM THE DIVISION OF INFORMATION, U. S. FISH AND WILDLIFE SERVICE, WASHINGTON 25, D. C. TYPES OF PUBLICATIONS ARE DESIGNATED AS FOLLOWS:

CFS - CURRENT FISHERY STATISTICS OF THE UNITED STATES AND ALASKA.
FL - FISHERY LEAFLETS.
SSR.- FISH. - SPECIAL SCIENTIFIC REPORTS--FISHERIES (LIMITED DISTRIBUTION).
SEP.- SEPARATES (REPRINTS) FROM COMMERCIAL FISHERIES REVIEW.

Number Title

CFS-1185 - Frozen Fish Report - Final - July 1955, 8 pp.

CFS-1189 - South Atlantic Fisheries, 1953 - Annual Summary, 10 pp.

CFS-1197 - Florida Landings - June 1955, 6 pp.

CFS-1199 - Alabama Landings - April 1955, 2 pp.

CFS-1200 - Alabama Landings - May 1955, 2 pp.

CFS-1201 - Alabama Landings - June 1955, 2 pp.

CFS-1202 - Texas Landings - July 1955, 3 pp.

CFS-1203 - Rhode Island Landings - July 1955, 3 pp.

CFS-1204 - Fish Meal and Oil - July 1955, 2 pp.

CFS-1205 - Frozen Fish Report - Aug. 1955, 2 pp.

CFS-1206 - North Carolina Landings - July 1955, 2 pp.

CFS-1207 - New Jersey Landings - July 1955, 2 pp.

CFS-1208 - New York Landings - July 1955, 4 pp.

Summary Minutes, American Fisheries Advisory Committee Second Meeting, August 25-26, 1955, Boston, Mass., 9 pp., processed.

FL - 254 - List of Fishery Associations in the United States, Alaska and Hawaii (revised May 1955), 12 pp., processed.

FL - 292 - List of Fishery Cooperatives in the United States and Alaska (revised June 1955), 5 pp., processed.

FL - 424 - Household Consumer Preferences for Breaded Shrimp & Breaded Fish Sticks, Part I - National and Regional Summary, by Richard A. Kahn and Walter H. Stolting, 61 pp., illus., processed, July 1955.

Sep. No. 416 - Preliminary Report on Exploratory Long-Line Fishing for Tuna in the Gulf of Mexico and the Caribbean Sea: Part I - Exploratory Fishing by the Oregon; Part II - Long-Line Gear Used in Yellowfin Tuna Exploration.

Sep. No. 417 - Brine Dipping of Haddock Fillets.

Sep. No. 418 - Research in Service Laboratories (October 1955):
Technological Research on the Fresh-Water Fisheries of the U. S.
Iron-Sulfide Discoloration of Tuna Cans.
No. 1 - Theory of Iron-Sulfide Formation in Cans.
Oyster Technological Research Continues During Summer.
Jellied Salmon.
New Federal Specifications for Certain Fishery Products.

SSR-Fish. No. 157 - Longline Fishing for Deep-Swimming Tunas in the Central Pacific, 1953, by Richard S. Shomura and Garth I. Murphy, 75 pp., illus., processed, September 1955. This is the fourth in a series of reports on a survey of the deep-swimming tunas of the central equatorial Pacific. This survey has been conducted by the Pacific Oceanic Fishery Investigations (POFI) as a portion of a larger investigation embracing the hydrography and productivity of the central Pacific as well as the fishery resources. Herein we summarize the salient features of six equatorial fishing cruises made between 140° W. and 170° W. longitude in 1953. In addition, the results of a considerable amount of Japanese fishing in 1953 between 160° W. longitude and 180° are discussed. Complete summaries of the POFI cruises and of the catch data from the Japanese fishing are given in the appendix.

SSR-Fish. No. 158 - Exploratory Experiments in Guiding Salmon Fingerlings by a Narrow D. C. Electric Field, by Parker S. Trefethen, 45 pp., illus., processed, June 1955.

SSR-Fish. No. 159 - Movements of Small Soft-Shell Clams (Mya arenaria), by Osgood R. Smith, 11 pp., illus., processed, June 1955.

SSR-Fish. No. 160 - Tests of Hatchery Foods for Salmon, 1953 and 1954, by Bobby D. Combs, David D. Palmer, John H. Finucane, and Roger E. Burrows, 9 pp., processed, August 1955.

MISCELLANEOUS PUBLICATIONS

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM. CORRESPONDENCE REGARDING PUBLICATIONS THAT FOLLOW SHOULD BE ADDRESSED TO THE RESPECTIVE ORGANIZATION OR PUBLISHER MENTIONED. DATA ON PRICES, IF READILY AVAILABLE, ARE SHOWN.

"Aircraft Technique for Beach Landing Craft," by J. Anthony Hind, article, International Fish and Other Food Journal, vol. 3, no. 2, 1955, pp. 24-25, illus., printed. International Fish and Other Food Journal, 6A Urtehaven, Copenhagen-Valby, Denmark. Fishing boats that land on open sandy beaches cannot go very far out to sea, but they are able to fish in coastal waters up to a distance of 20 nautical miles from shore efficiently. The

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATIONS ISSUING THEM.

disadvantages of normal methods of beach landing are presented. The Estlander method of beaching a fishing boat is described and illustrated; this method utilizes the boat's own winch to pull it up on to the beach along an outstretched line which is anchored at both ends, one on the shore and the other in the sea at a suitable distance from the beach. The article also describes a light-weight 30-foot motor fishing boat with retractable landing gear complete with rubber wheels. This type of craft is reported to be practical for areas where the fishing craft must land on the beach due to the lack of suitable harbors and docks.

L'Amenagement des Eaux Douces et la Recherche Piscicole, by R. Vibert, 51 pp., illus., printed in French. Conseil Superieur de la Peche, 1, Avenue de Lowendal, Paris, France.

"Bar Clam Resources," article, Trade News, vol. 8, no. 3, September 1955, pp. 8-10, illus., printed. Department of Fisheries, Ottawa, Canada. Describes a survey of the bar clam or sea clam (Spisula solidissima) resources of Canada's Maritime Provinces. Considering the quantities of clams obtained by dredging and the prevailing prices of bar clams, and comparing these with returns from other types of fishing where boats and gear of similar cost are involved, it was concluded that the deep-water bar clam beds on the coast cannot be profitably fished by hydraulic dredges. Bar clams can be produced at low cost, however, by manual collection (hand digging) during spring tides from the lowest parts of the intertidal beaches. This is by no means an insignificant resource because the areas that could be exploited are vast. They do have, however, the disadvantage of intermittant accessibility. Collection is possible for only three or four days every two weeks. When market demand for bar clams is heavy this disadvantage should not be serious enough to prevent the development of the resource. In many areas processors handle several kinds of fish products more or less simultaneously and fishermen are interested in part-time employment. In such places the bar clam could be more widely used to provide a welcome increase in income to the inshore fishermen and the processor.

Biennial Report, 1953-1954, Publication No. 2, 83 pp. illus., printed. Marine Biological Laboratory, University of Delaware, Newark and Lewes, Del., December 1954. This report covers the work of the Marine Laboratory in the calendar years 1953 and 1954 and describes the major projects and presents their objectives, activities, and accomplishments. The report covers the eight projects in progress or completed during the biennium: included are studies on the basic biology of the sea trout (weakfish); commercial trawl fishing in Delaware Bay; a fisheries statistical program, including both the commercial and sport fisheries; the plankton and hydrographic features of the bay; blue crab and oyster studies. The report also has a section on the teaching of Marine Biology at the University.

Bulletin de L'Institut International du Froid (Bulletin of the International Institute of Refrigeration), Numero Special IX[e] Congres International du Froid, vol. XXXV, no. 4, pp. 656-1002, illus., printed in English and French. Institut International du Froid, 177 Boulevard Malesherbes, Paris 17, France, 1955. A special issue containing papers presented at the International Congress of Refrigeration on problems relating to refrigeration.

Bulletin de L'Institut des Peches Maritimes du Maroc, No. 2, 81 pp., illus., printed in French. Institut des Peches Maritimes du Maroc, Casablanca, Morocco, December 1954. Contains the following articles: "Les Merlus du Maroc et Leur Peche," by Claude Maurin; and "Le Cerveau de Merluccius merluccius (L.) et de Merluccius senegalensis cadenat," by W. Geiger.

Bulletin of the Faculty of Fisheries, Hokkaido University, vol. 5, no. 4, 78 pp., illus., printed in Japanese with summaries in English. Hakodate, Japan, February 1955. Contains among others the following scientific papers: "An Experimental Study for Estimating the Approximate Amount of Fish Shoals by Echo Sounding Method;" "Studies in the Bacteriological Chemistry of Shark Muscle Spoilage. I. On the Changes of Urease-Activity and Bacterial Flora During Shark Muscle Spoilage;" "Mechanical Studies of Fishing Net Materials. III. Some Information on the Tensile Strength of Netting Cord (2);" "Studies on the Nutritive Value of the Meat of Sea Cucumber (Stichopus japonicus SELENKA): I. General Introduction and Explanation of Plan of Investigations; II. Seasonal Changes of Chemical Components of the meat of Stichopus japaonicus; III. A comparison of the Chemical Components of the Meat of Sea Cucumber with the Meat of Other Marine Animals; IV. Digestibility of Meat of Sea Cucumbers.

The Businessman's Guide to Government Information and Advice, edited by Sherman S. Cohen, 98 pp., printed, $2. American Association for Public Information, Education and Research, Washington 5, D. C., 1955. A handy guide to government sources designed for businessmen including an annotated bibliography of publications issued by all major Government agencies. Part I of the booklet explains how to obtain information and advice from the branches and agencies of the Federal Government. Part II contains an annotated bibliography of important government publications which warrant use as a basic reference library. It represents a selection of current studies and reports in the special fields of banking and finance, domestic commerce, family affairs, foreign trade, government procurement, labor relations, public administration, small business management, and transportation. Part II identifies key personnel who are responsible for the compilation and publication of vital economic and business data.

(Canada) Department of Fisheries Twenty-Fourth Annual Report, 1953-1954, 75 pp., printed. Department of Fisheries, Ottawa, Canada. This is the 87th Annual Fisheries Report of the Government of Canada. Discusses the conservation and development service; inspection and consumer service; markets and economics service; information and educational service;

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Fishermen's Indemnity Fund; Fisheries Prices Support Board; Fisheries Research Board; international commissions; and special committees. A section of the report is devoted to a review of Canada during 1953 and statistics of the fisheries. An appendix presents the financial statements of the Department's various activities for 1953/54.

(Canada) Journal of the Fisheries Research Board of Canada, vol. XII, no. 5, illus., printed, September 1955. Fisheries Research Board of Canada, Ottawa, Canada. Contains, among others, the following articles: "Extracts and Enzymic Hydrolysates from Fish Liver and Mammalian Liver," by A. Guttmann; "Note on Albumin Protein Fractions in a Sturgeon," by J. R. Dingle and W. J. Dyer; "Estimation of Recruitment and Natural Mortality Rate from Age-Composition and Catch Data in British Columbia Herring Population," by Albert L. Tester; "Atlantic Cod Populations Along the Southern Canadian Mainland as Shown by Vertebral Count Studies," by R. A. McKenzie and G. F. M. Smith; "A Comparison of Atlantic Sea Sturgeon with a New Subspecies from the Gulf of Mexico (Acipenser oxyrhynchus de sotoi)," by Vadim D. Vladykov; and "The Inconnu (Stenodus leucichthys mackenziei) in Great Slave Lake and Adjoining Waters," by W. A. Fuller.

The Commercial Fish and Fisheries of Queensland, by J. Douglas Ogilby, revised and illus., by Tom C. Marshall, printed. Fisheries Branch, Department of Harbours and Marine, Brisbane, Queensland, Australia.

Contribution to the Biology of the AHOLEHOLE (a Potential Baitfish), by Albert L. Tester and Michio Takata, Industrial Research Advisory Council Grant No. 29, Final Report, Contribution No. 38 of the Hawaii Marine Laboratory, 60 pp., illus., printed. Hawaii Marine Laboratory, University of Hawaii, Honolulu, Hawaii, June 1953.

"The Contribution of Oceanographic Research to Fisheries Science," by G. L. Kesteven, article, FAO Fisheries Bulletin, vol. VIII, no. 2, April-June 1955, pp. 67-76, illus., printed. Food and Agriculture Organization of the United Nations, Rome, Italy. (For sale by the Columbia University Press, International Documents Service, 2960 Broadway, New York 27, N. Y.) The contribution of oceanography to fisheries research, which means research in economic and technical fields as well as biological, is to be understood only in terms of the applied character of fisheries science. The author, in reviewing the implications of this statement, states that "one principal consequence should be stressed; namely, that it obliges the fisheries scientist to discriminate keenly, and frequently to scrutinize his activities to determine whether they will stand the test of their application to practical fisheries problems." A brief account is given of the role played by oceanography in assisting fisheries biology in describing fishery resources, in each of the principal divisions of its work. It discusses oceanography and its relation to the distribution, abundance, and behavior of fish, fishing operations, and fisheries science.

Des Poissons sur nos Tables, 36 pp., illus., printed in French. Comité National de Propagande pour la Consommation du Poisson, 11 Rue Anatole de la Forge, Paris XVII, France. Contains the following articles: "Un Aliment de Qualité: le Poisson," by Ch. Richet; "L'Alimentation par le Poisson," by Michel Polonovski; "La Chair du Poisson, Source de Phosphore et de Calcium Alimentaires," by Lucie Randoin; "L'Alimentation des Enfants par le Poisson," by E. Lesne; "Les Poissons Jugent les Hommes," by M. Fontaine; and "Prejuges sur le Poisson," by Pierre Delore.

Directory of Organizations and Officials Concerned with the Protection of Wildlife and other Natural Resources, by Stewart M. Brandborg, 64 pp., printed, 25 cents. National Wildlife Federation, 232 Carroll Street NW., Washington 12, D. C., July 1, 1955. This is the forty-seventh edition of this directory. It is designed as a convenient reference to sources of information of wildlife (including fisheries) and as a guide to agencies and organizations that are either directly or indirectly concerned with the perpetuation and management of wildlife resources. Public agencies of national, state, and territorial governments of the United States are listed, as well as those of neighboring nations in North and South America. Most of the nongovernment organizations within the United States having a national or statewide scope of interest are included.

Ecological Factors Related to the Distribution of BANKIA GOULDI Bartsch in Chesapeake Bay, by Rudolf S. Scheltema and R. V. Truitt, Publication 100, 31 pp., illus., printed. Chesapeake Biological Laboratory, Solomons Island, Md., May 1954.

Efficiency and Selectivity of Commercial Fishing Devices Used on the Mississippi River, by William C. Starrett and Paul G. Barnickol, 46 pp., illus., printed (Reprinted from Bulletin of the Illinois Natural History Survey, vol. 26, article 4, July 1955, pp. 321-366.) Illinois Natural History Survey, Natural Resources Bldg., Urbana, Ill. In 1944 and 1946, a fishery survey was made of the Mississippi River between Caruthersville, Missouri, and Dubuque, Iowa, under the auspices of the Technical Committee for Fisheries, a subgroup of the Upper Mississippi River Conservation Committee. This paper is a statistical analysis of the catch data relative to the efficiency and selectivity of the various commercial fishing devices used during the survey. It is believed that such an analysis could be of value to persons interested in the management of the river's commercial fishery. It was demonstrated in the survey that commercial fishing devices can be fished on a selective basis. Of the fishing devices tested, basket traps and floating trammel nets were found to be the ones most selective for commercial species. Other devices were found to be quite selective when fished for a particular species of fish. The type of fishing device, the mesh size, and the fishing site influenced the species composition of the catch. Missouri statutes no longer specify minimum size limits for any commercial fish, except catfish. Illinois and Iowa still have minimum

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size limits on certain commercial species. Analysis of data from the survey indicates that, where minimum size limits of commercial fish are necessary, sizes of fish caught can be controlled by using nets of certain mesh sizes. The use of mesh size as a means of controlling the size of fish in the commercial catches reduces the labor of complying with the law by eliminating the necessity for measuring the fish in the catches.

Estuarine Bulletin, vol. 1, no. 1, 6 pp., illus., proccessed. University of Delaware Marine Laboratory, Newark, Del., August 1955. The aim of this new publication is to present in a nontechnical fashion, sound factual information regarding the nature of Delaware's waters and the animals they contain. It is a semi-official organ for the University of Delaware Marine Laboratory in which its objectives and progress may be reviewed.

Extent of Herring Spawning in British Columbia Waters During 1955, by D. N. Outram, Circular No. 37, 10 pp., illus., processed. Pacific Biological Station, Fisheries Research Board of Canada, Nanaimo, British Columbia, July 1955.

Fiskeri-Beretning for Året 1954, 244 pp., illus., printed in Danish with English and French resumes. I Kommission Hos G.E.C. Gad, Kobenhavan, Denmark. This report contains detailed statistics on the Danish fisheries for the calendar year 1954. Included in the report are data on number of fishermen, number of fishing craft, value of fishing vessels, catch by species, landed value of the catch, resumes by fisheries, and imports and exports of fishery products. Also includes names of fish and shellfish in Danish, Latin, English, Swedish, German, and French.

The Food Habits of Hatchery-Produced Pond-Cultured Shad (ALOSA SAPIDISSIMA) Reared to a Length of Two Inches, by Galen H. Maxfield, Publication No. 98, 38 pp., illus., printed. Chesapeake Biological Laboratory, Solomons Island, Md., December 1953.

"Food for the Future," by J. G. Harrar, article, Science, vol. 122, no. 3164, August 19, 1955, pp. 313-316, printed, single copy 25 cents. Science, 1515 Massachusetts Ave., NW, Washington 5, D. C. This article by the Director for Agriculture, Rockefeller Foundation, New York, points out that it is the responsibility of all segments of society, not exclusively that of the scientist, to promote the wise use of natural resources. The author briefly mentions "the current interest in the sea as a gigantic and relatively untapped food resource." With increased knowledge of the sea and its resources, the food harvest from the sea can be increased enormously.

The General Agreement on Tariffs and Trade (GATT), Department of State Publication 5993, Commercial Policy Series 151, 87 pp., printed, 30 cents. Department of State, Washington, D. C. (For sale by the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Gremio dos Armadores da Pesca da Sardinha (Relatorio e Contas do Exercicio de 1953 e Orcamento para 1954), 23 pp., printed in Portuguese. Lisbon, Portugal.

Gremio dos Armadores de Navios da Pesca do Bacalhau (Relatorio e Contas do Exercicio de 1954 e Orcamento para 1955), 32 pp., printed in Portuguese. Lisbon, Portugal.

Harvest of the Sea, by Walter Buehr, 96 pp., illus., printed, $2.50. William Morrow & Co., Inc., 425 4th Ave., N. Y. 16, N. Y. This is a book on commercial fishing for young people.

Havsfiske (Ocean Fisheries), by Nils Rosen, pp. 304-334, illus., printed in Swedish. (Reprinted from Boken om Havet, Del III (The Book of the Ocean, Part III)). Sohlmans Forlag, Stockholm, Sweden.

"Holding Lobsters Alive," article, Trade News, vol. 8, no. 2, August 1955, pp. 3-4, illus., printed. The Department of Fisheries of Canada, Ottawa, Canada. Because lobster catches and market demands vary, it is necessary to hold live lobsters in pounds or in shops anywhere from several days to several months. Even for experienced pound operators this is a critical period. At times heavy losses may, and often do occur, because of unfavorable holding conditions. Scientists of the Fisheries Research Board of Canada at the Atlantic Biological Station, St. Andrews, N. B., have been carrying out experiments on the holding of lobsters. These scientists describe some of their conclusions in this article which is based on experiments in which over 7,000 lobsters were held under various conditions. They have determined the three most important factors to be: (1) water temperature; (2) the amount of salt in the water; and (3) the amount of oxygen dissolved in the water.

Home Freezing of Foods, Circular 527, 36 pp., illus., printed. University of Kentucky, College of Agriculture and Home Economics, Extension Division, Lexington, Ky. Directions are given for freezing and storing foods, including fish. Quick freezing is an excellent method of preservation, and if good methods and correct temperatures are used, foods will retain most of their nutritive value, natural color, flavor, and texture.

"The Homing Salmon," by Arthur D. Hasler and James A. Larsen, article, Scientific American, vol. 193, no. 2, August 1955, pp. 72-76, illus. printed, single copy 50 cents. Scientific American, 2 West 45th Street, New York 36, N. Y. This article discusses recent laboratory and field experiments which indicate that salmon find their way back to the waters of their birth by means of a remarkably refined sense of smell.

How the Bureau of Foreign Commerce Works for You, 28 pp., illus., printed. U. S. Department of Commerce, Washington 25, D. C. This booklet explains what the Bureau of Foreign Commerce does to foster, promote, and develop international trade; describes the many different

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types of consultative and information services available to United States businessmen through the Bureau and the Department's 33 field offices.

Industrial and Manufacturing Chemistry, $50. Part I. Organic (A Practical Treatise), by Geoffrey Martin (Seventh Edition revised by Edward I. Cooke), 773 pp., illus., printed. Part II. Inorganic (in two volumes), by Geoffrey Martin (Sixth Edition revised by Wilfrid Francis), vol. I, 623 pp., and vol. II, 512 pp.; illus., printed. Philosophical Library, Inc., 15 E. 40th St., New York 16, N. Y., 1955. These books are a treatise on the applications of Organic and Inorganic Chemistry to the arts and manufacturers. They deal both with British and American practice and contain as much up-to-date information as available regarding the various branches of the chemical industry and of manufacturers having a chemical basis. Statistics are made a feature of these works. Not only main industries have been covered, but minor industries and new and unusual processes and products are also included. The profitable utilization of byproducts has received special consideration. Of particular interest to the fishing and allied industries are the references in Part I to quick smoking, fish bladder glues, fish glues, agar-agar gelatine, Irish moss gelatine, and fish oils. On fish oils, the author includes data on bleaching, constants, deodorizing, hydrogenation, and iodine values. A reference to fish stearine and fish tallow is also made. Part II, which is a continuation or supplement to Part I, contains sections dealing with salt for the fishing industry, freezing mixtures, ice-making machines, iodine from sea weed, algin, amino acids, composition of brine, purification of brine, fish scrap, fish manures, and fish guanos. All of the books in this series contain full literary references prefixed to each article and all are fully indexed. For those engaged in any type of research which involves organic or inorganic chemistry, these books are an invaluable source of information. For those interested in new processes or in learning about new industries, these books would be of considerable help.

--J. Pileggi

(International North Pacific Fisheries Commission) Bulletin No. 1, 140 pp., illus., printed. International North Pacific Fisheries Commission, Vancouver, B. C., Canada, June 1955. In 1954, the International North Pacific Fisheries Commission established a Committee on Biology and Research for the purpose of (a) reviewing existing knowledge of the North Pacific fisheries, (b) determining what further knowledge is necessary, and (c) recommending a research program designed to obtain that knowledge. The Commission will periodically publish reports on scientific investigations which are related to its interests. This bulletin, the first of a publication series, presents material which will provide general perspective and background for succeeding papers dealing with more detailed aspects. The documentation prepared by and for the Committee on Biology and Research was intended to serve this purpose of orientation. The following papers, appearing in this bulletin, were therefore published not as original research material, but rather as a symposium on biological, ecological, and industrial factors characterizing those fisheries of the North Pacific area of primary, immediate interest to the Commission: (1) "The Pacific Salmon (Genus oncorhynchus) of the Canadian Pacific Coast, with Particular Reference to their Occurrence in or Near Fresh Water," by R. E. Foerster; (2) "On the Salmon in Waters Adjacent to Japan--A Biological Review;" (3) "A Brief Review of the Salmon Fishery in the Aleutian Islands Area," by C. E. Atkinson; (4) "The Pacific Herring (Clupea pallasi) along the Pacific Coast of Canada," by F. H. C. Taylor; and (5) "Oceanography along the Canadian Pacific Coast," by J. P. Tully.

(International Commission for the Northwest Atlantic Fisheries) Statistical Bulletin for the Year 1953, vol. 3, 56 pp., illus., printed. International Commission for the Northwest Atlantic Fisheries, Halifax, N. S., Canada, 1955. This bulletin is divided into three parts as follows: Part 1 deals with the development of the fisheries in the Convention Area over a series of years. It includes figures on landings by species and subareas and trends of landings by countries. It also includes a list of species of fish with their scientific names and the common names used in the participating countries. Part 2 gives the statistics, for the calendar year 1953, of landings (converted to round, fresh fish) and fishing-effort data. In particular cases yields per unit of effort are also given. Part 3 contains corrections and amendments to the statistics published in the earlier volumes.

A Key to the Commercial and Potentially Commercial Shrimp of the Family PENAEIDAE of the Western North Atlantic and the Gulf of Mexico, by Gilbert L. Voss, Technical Series No. 14, 23 pp., illus., printed. State Board of Conservation, Tallahassee, Fla., May 1955. This paper presents illustrations of 19 species of commercial shrimp of the Western North Atlantic and the Gulf of Mexico and a key that should be of use to the field worker and fisherman, as well as the scientist, in the identification of shrimp. The author has attempted to illustrate the carapace and rostrum of all of the species in the key. In order that this paper may be more useful to those nonspecialists interested in learning more about shrimp systematics and morphology, a selected bibliography has been added, in which are found most of the original references to the species in the key, works pertinent to the area, and one or two general reference works consulted during the course of this study.

La Soberania Maritima del Peru (Defensa de las 200 millas de mar peruano ante las recientes transgresiones), by Enrique Garcia Sayan, 64 pp., illus., printed in Spanish. Talleres Graficos P. L. Villanueva, S. A., Lampa 277, Lima, Peru, 1955.

(Maryland) Annual Report, 1953, Department of Research and Education, by R. V. Truitt, Educational Series No. 34, 30 pp., illus., printed. (Reprinted from Tenth Annual Report, Maryland Board of Natural Resources, 1953.) Chesapeake Biological Laboratory, Maryland Department of Research and Education, Solomons Island,

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Maryland. Discusses the work of the Maryland Department of Research and Education and its Chesapeake Biological Laboratory on fish research and statistics, hatcheries, oysters, crabs, marine fouling, hydrography, and ecology of Chincoteague Bay.

Maryland Commercial Fish Hatchery Operations, 1952-1953, by Earl T. Walker and T. Harvey Mister, Educational Series No. 35, 8 pp., illus., printed. Chesapeake Biological Laboratory, Solomons Island, Md., February 1954.

Maryland Commercial Fisheries Statistics, 1951-1952, by Harry A. Hensel and Richard E. Tiller, Publication No. 99, 28 pp. (mostly tables), illus., printed. Chesapeake Biological Laboratory, Solomons Island, Md., May 1954.

Maryland Commercial Fishing Gears III. The Crab Gears, by David G. Cargo, Educational Series No. 36, 18 pp., illus., printed. Board of Natural Resources, Department of Research and Education, Solomons Island, Md., April 1954. Briefly describes the various types of gear used to capture blue crabs commercially. The four major units employed in the Maryland portion of Chesapeake Bay are: (1) trotline; (2) pot; (3) scrape; and (4) dip net. An additional four units are prohibited by law in Maryland or are employed so seldom as to be of little consequence: the dredge, the fyke, the haul seine, and the push net.

Maryland's Living Waters, by Byron L. Ashbaugh and Paul W. McKee, Educational Series No. 37, 22 pp., illus., printed. Board of Natural Resources, Department of Research and Education, Solomons Island, Md., May 1954.

Maryland Natural Resource Bibliography (A guide to key works dealing with the Zoology, Botany, Geology and related subjects), by Romeo Mansueti, Resource Study Report No. 7, 27 pp., illus., printed. Maryland Department of Research and Education, Chesapeake Biological Laboratory, Solomons Island, Md. The purpose of this bibliography is: (1) to list the most important and comprehensive references dealing with specific natural resources (including fisheries) in the Maryland region so that any interested person can name, classify, or obtain information pertaining to the various animals, plants, minerals, and related natural resources; (2) to trace bibliographically the rise and progress of the study of various fields of natural history and related subjects in the Maryland region; (3) to show bibliographically the respective roles played by the various institutions and individuals in the development and increase in knowledge of Maryland zoology, botany, geology, paleontology, archaeology, and related subjects; (4) to suggest fields of study in Maryland natural resources that are as yet unexplored if references can indicate in general the status of knowledge of each subject.

NFBA Directory of Members, 190 pp., printed. National Food Brokers Association, Washington, D. C., August 1955. Lists the leading food brokers and included are brokers of canned, frozen, and other fishery products.

"New Echo-Sounding Methods at Bear Island," article, World Fishing, vol. 4, no. 10, October 1955, pp. 18-21, illus., printed, single copy 2s. 6d. (35 US cents). John Trundell Ltd., Temple Chambers, Temple Ave., London, E.C. 4. The Ernest Holt, the distant-water research vessel of the British Ministry of Agriculture, Fisheries and Food, confirmed that echo-sounding even in deep water is on the way to giving a real estimate of the possible catch: it might be nil, or 10 baskets, or 30 baskets. By taking the trouble to watch the cathode-ray tube continuously and noting the number of minutes when good fish echoes were showing during a tow, it was possible to say how many baskets of cod there would be in the cod end; that is, when all went well. There were a few snags, and in order to adopt the Ernest Holt's present methods in a fishing vessel, two extra operators would have to be carried. A well-known type of echo-sounder with a cathode-ray tube presentation was used throughout.

"The New South Wales Trawlfishery: Review of Past Course and Examination of Present Condition," by T. W. Houston, article, Australian Journal of Marine and Freshwater Research, vol. 6, no. 2, August 1955, pp. 165-208, illus., printed, single copy 7s. 6d. (84 U.S. cents). Commonwealth Scientific and Industrial Research Organization, 314 Albert Street, East Melbourn, C. 2, Victoria, Australia.

(New Zealand) Annual Report of the Marine Department (1 April 1954 to 31 March 1955), 63 pp., printed. Marine Department, Wellington, New Zealand, 1955. Among others, the report contains a section on the fisheries of New Zealand which discusses crayfish, fishing vessels and personnel, fish landings, methods of capture, landings by ports, exports and imports, whaling, oysters, whitebait, mussels, fresh-water fisheries and research, marine research, and legislation. The section concludes with a series of tables giving detailed data on the fisheries.

Norges Fiskerier, 1952 (Fisheries Statistics of Norway), Norges Offisielle Statistikk Series XI, no. 205, 110 pp., illus., printed in Norwegian with a table of contents also in English, Kr. 3.50 net (50 U. S. cents). Fiskeridirektoren, Bergen, Norway, 1955. (Printed by H. Aschehoug & Co., Oslo, Norway.) Contains the official annual fisheries statistics of Norway by districts. Includes quantity, value, and average prices for all species of fish caught commercially. Also gives statistics on number of fishermen and craft, and number and type of gear, as well as data on fish-processing plants. Information on utilization of catch and on participation by men and craft is also given for the most important sections of the fishing industry. Also contains a list of scientific and common names (in four different languages) of fish, crustaceans, mollusks, and other aquatic organisms in Norwegian waters; drawings of the principal species of fish, crustaceans, and mollusks; and drawings of the different types of fishing gear.

The Ocean Fishery (Massachusetts' Oldest Industry), 28 pp., illus., printed. Department of Natural Resources, Division of Marine Fisheries, 15 Ashburton Place, Boston, Mass. A brief but

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comprehensive sketch of the oldest industry in Massachusetts, which has remained a vital asset to her coastal communities. The booklet begins by describing the early days of the fishing industry, the bank fishermen, and whaling. In discussing the industry and methods of today, the various types of fishing and fisheries are described. A section of the booklet is devoted to recent developments and the future of the industry.

Open Boat Whaling in the Azores (The History and Present Methods of a Relic Industry), by Robert Clarke, "Discovery Reports," vol. XXVI, pp. 281-354, plates XIII-XVIII, printed, single copy 21s. (US$2.95). Cambridge University Press American Branch, 32 East 57th Street, New York 22, N. Y., 1954. The report has a historical and a technical section. To these are appended a few notes on Madeiran whaling. The historical section falls naturally into two parts: the first describes the role of the Azores and their inhabitants in the pelagic sperm-whaling industry which the New Englanders inspired and monopolized during the eighteenth and nineteenth centuries; the second part traces from these whaleship days the emergence and subsequent fortunes of the shore whale fishery up to the existing fishery and employs throughout comparisons with old-time American whaling. The cliff lookouts, the whaleboat and its gear and employment, the motor towboat, whale hunting, modern stations, ambergris, scrimshaw, and sperm leather are all described and discussed. The most recent statistics appearing in the study are for 1949. "Discovery Reports" are issued by the National Institute of Oceanography.

"Poisson et Crustace Congeles," by F. Bramsneas, article, Annexe 1955-1, Supplement au Bulletin de Institut International du Froid (Bulletin of the International Institute of Refrigeration), Commissions 4 and 5, Madrid (Espagne), May 31-June 5, 1954, pp. 83-99, printed in French with summary in English. Institute International du Froid, 177 Boulevard Malesherbes, Paris 17, France. The author states that "The alterations of quality that take place in frozen fish were earlier explained by the theory of the disruption of cell tissue. Quick freezing became the slogan at that time. It has, however, later been shown through profound organoleptic investigations that the freezing itself plays a minor role, while the conditions of subsequent storage, i.e., temperature and time, are of the utmost importance. The quality of the frozen fillet is highly dependent on the freshness of the raw material as illustrated by the well-known Norwegian freezing experiments with cod. The problem of freezing on board the fishing vessel is of interest in this connection. Frozen fillets produced from wet fish of high quality are to be preferred. Production of fillets from frozen whole fish is, however, probably of interest in regions where only several-days-iced wet fish are available. A number of freezing plants dip the wet fillets in brine before freezing in order to reduce the drip loss. The brine procedure, however, impairs the quality in other directions. Among the number of antioxidants so far only ascorbic acid, although expensive, seems recommendable, especially for the freezing of fat fish. The common freezing procedure, besides contact freezing, is tunnel freezing. The speed of the air should be about 5-12 meters (16-39 feet) per second, i.e., greater than thought earlier. It is important that the entire cross section of the tunnel is filled up with goods, during freezing operation. Freezing through liquid contact is not yet a widespread practice, apart from the inexpensive brine freezing of boxes with herring known from Norway. The implication of effective packing is mentioned. Even slight drying up of the surface of the fish means an increased rate of rancidity. This may happen when a carton is not filled up completely, even though the wrapping material may be airtight. A good water ice is still the cheapest and most effective wrapper. The effect of the ice is prolonged if the goods are stored in a jacketed cold-storage room. Freezing of crustaceans meets with particular difficulties, such as early dehydration and color changes. In this case tight wrapping and low temperatures are essential. A lowering of the storage temperature of 5-10° C. doubles the possible storage period for frozen fish products in general. There is a definite tendency to lower storage temperatures in new cold-storage plants in Europe and the United States. Low temperatures are particularly important when the fish is intended for subsequent canning as shown in experiments in the canning of sprat in Norway. Impaired quality in frozen storage is due, apart from rancidity, mainly to the denaturation of the protein matter. The cause of the denaturation cannot yet be fully explained, but it has been followed experimentally and proved to depend a great deal on the storage temperature."

Problems of Ocean Fisheries (Report to the Legislature Pursuant to House Resolution No. 150--1953), Assembly Interim Committee Reports 1953-1955, vol. 5, no. 1, 21 pp., printed. Assembly of the State of California, Sacramento 14, Calif., March 1955. This report is directed to a study of the conditions and regulatory needs for the protection and conservation of certain ocean fisheries as embraced by proposed legislation in Assembly Bills Nos. 597 and 1734, and Senate Bill No. 264 presented at the 1953 Session of the Legislature. It also includes special study and recommendations covering the yellowtail, sardine, and anchovy problems.

Progress Reports of the Atlantic Coast Stations, no. 62, 43 pp., illus., printed, in English and French. Fisheries Research Board of Canada, Atlantic Biological Station, St. Andrews, N. B.

Progress Report on the Development of the British Columbia Mid-Water Trawl for Herring, by W. E. Barraclough and W. W. Johnson, Circular No. 36, 25 pp., illus., processed. Pacific Biological Station, Fisheries Research Board of Canada, Nanaimo, B.C., March 1955. This outline of the history of mid-water trawling in British Columbia describes and dates a number of recent experiments. Preliminary results found the net very effective at night, as the herring were rising off the bottom and at the period before daybreak as they were descending to the bottom. Catches of 20 to 30

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tons of herring were made on six different tows at night. Catches during the day averaged much lighter. One catch of an estimated 100 tons burst the net upon surfacing. The net has a 40-foot square mouth opening with four quarter wings, and a length of 175 feet over-all from the wing to the cod end. Graduated sizes of nylon mesh were used, varying from 5, 4½, and 3 inches in the wings and body, to 1¼-inch mesh in the cod end. Detailed patterns and instructions for net fabrication are included. The net is equipped with trawl-plane floats on the headrope and depressors are attached to the two lower wings. The four bridle lines are of ⅜-inch wire rope and those attached to the headrope and footrope wings were 31 and 30 feet long, respectively. At the two points dualfin otter boards are attached on 10-fathom pennant lines. Towing warps were of conventional wire rope from a double-drum-stern-set trawler. Detailed descriptions for building depressors and dualfin otter doors as well as instructions on governing the fishing depth of the trawl and methods of brailing the catch are included.

--J. L. Squire, Jr.

Proposed Trade Practice Rules for the Frozen Food Industry, 13 pp., printed. Federal Trade Commission, Washington 25, D. C.

Public Notice of Investigation and Hearings, Investigation No. 4 under Section 3 of the Trade Agreements Extension Act of 1951, as Amended, and Section 332 of the Tariff Act of 1930, with Respect to Articles Listed for Consideration in Proposed Trade Agreement Negotiations with Contracting Parties of GATT, 5 pp., processed. United States Tariff Commission, Washington 25, D. C., September 21, 1955.

"The Quick-Freezing of Fish Discussed by Fourteen Countries," by E. W. McCabe, article, Modern Refrigeration, vol. LVIII, no. 688, July 1955, pp. 231-234, illus., printed, single copy 2s. 6d. (about 34 U. S. cents). Modern Refrigeration, Terminal House, 52 Grosvenor Gardens, London, S. W. 1, England. Sixty delegates from fourteen countries--Austria, Belgium, Canada, Denmark, France, W. Germany, Great Britain, Greece, Holland, Iceland, Ireland, Italy, Norway, and Sweden--recently attended a "workshop" arranged by the office of European Economic Cooperation in Kiel, Germany. Its object was the pooling of technical and commercial knowledge which has been gained up to the present in the technique of improving quality and packing of quick-frozen fish which so greatly affects the fishing industry of all Europe. Summaries are given of the papers which were presented at the workshop and the discussions which followed the presentation of the papers.

"A Rapid Method for the Determination of Moisture Content in Fish Meat," by Yasuhiko Tsuchiya and Tomo Nakano, article, Tohoku Journal of Agricultural Research, vol. V. no. 2, December 1954, pp. 93-97, illus., printed. Faculty of Agriculture, Tohoku University, Sendai, Japan.

Regulation and Investigation of the Pacific Halibut Fishery in 1954, Report of the International Pacific Halibut Commission No. 22, 33 pp., illus., printed. International Pacific Halibut Commission, Seattle, Washington, 1955. A brief review of the Commission's activities during 1954 with reference to the preservation of the halibut fishery of the Northern Pacific Ocean and Bering Sea. In 1954 the Commission continued the regulation of the halibut fishery and the statistical and biological investigations that form the basis for current and the historical background of the convention between Canada and the United States for the preservation of the Northern Pacific halibut fishery, the 1954 regulations, statistics of the fishery, the fishery in special areas, catch per unit of fishing effort, composition of catches, and tagging operations 1954.

Rehabilitation and Development of Agriculture, Forestry and Fisheries in South Korea (Report prepared for the United Nations Korean Reconstruction Agency by a Mission Selected by the Food and Agriculture Organization of the United Nations), $8.75. Columbia University Press, New York, N. Y.

"Retaining the Quality of Fishery Products," by Charles Butler, article, Industrial Refrigeration, vol. 129, no. 3, September 1955, pp. 18-19, printed, single copy 25 cents. Nickerson & Collins Co., 433 N. Waller Ave., Chicago 44, Ill.

"Seafood Canning Plant," by Claude Gresham, article, Louisiana Conservationist, vol. 7, no. 10, September 1955, pp. 11-13, illus., printed. Louisiana Wild Life and Fisheries Commission, 126 Civil Courts Bldg., New Orleans, La. Louisiana seafood is well-known throughout the nation, and this pleasing notoriety is due primarily to the oysters and shrimp which leave the State in cans. One of the largest of the seafood canning plants in Louisiana is located in Harvey, just across the Mississippi River from New Orleans. This article gives a glimpse into the operations of this company at a time when they were canning oysters. A series of pictures portrays the processing steps for oysters from the time they are unloaded from the luggers through all the processes until the cans are placed in railroad cars for national distribution.

The Sea Nettle, Chesapeake Bay's Troublesome Summer Jellyfish, by R. Mansueti, 2 pp., illus., printed. (Reprinted from Maryland Tidewater News, vol. 12, no. 3, supplement no. 7, August 1955.) Maryland Department of Research and Education, Chesapeake Biological Laboratory, Solomons Island, Md.

"Small Boat and Gear Insurance for Canadian Fishermen," by I. S. McArthur, article FAO Fisheries Bulletin, vol. VIII, no. 2, April-June 1955, pp. 77-85, printed. Food and Agriculture Organization of the United Nations, Rome, Italy. (For sale by the Columbia University Press, International Documents Service, 2960 Broadway, New York 27, N. Y.) Describes a detailed study of the problems of small-boat and gear insurance for Canadian fishermen. All possible data were secured on loss experience over a period of years, and fishermen and

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fishermen's groups were interviewed to determine the attitude of fishermen and the extent to which they would be willing and able to contribute in the way of annual premiums. Vessel and lobster-trap insurance plans and a general description of their operation are presented. The lobster-trap plan has proved to be much more difficult to administer than the vessel scheme, particularly because losses occur a few at a time over an extended period. Since these losses are frequently replaced during the season, it is necessary to insure that the records are at all times complete and that premiums are paid on the traps replacing those lost. Considerable pressure has been brought to bear to extend the insurance plan to other types of fishing equipment, such as nets, weirs, etc. But from the experience gained with the lobster-trap plan, it is obvious that any attempt to insure fishing gear generally would be very difficult indeed. Most types of fishing gear, expecially nets, wear out in two or three years and the constant repair of such gear would make it almost impossible to identify the item insured.

Shrimp and Prawn Prospecting on the British Columbia Coast, June to December 1954, by T. H. Butler and G. V. Dubokovic, Circular No. 35, 92 pp., illus., processed, Pacific Biological Station, Fisheries Research Board of Canada, Nanaimo, B. C., February 1955. Describes the 1954 progress in the exploratory fishing program to find new shrimp grounds off the British Columbia coast. Fishing was conducted with small otter trawls and traps by the contract trawler Yuri M. Exploratory fishing was conducted off the west coast of Vancouver Island, in Georgia Strait, Juan de Fuca Strait, and along the Northern British Columbia coast. Shrimp of the "smooth pink" (Pandalus jordani) and "side-stripe" type (Pandalus dispai) were taken in commercial quantities by trawl in the Barkley Sound area. Trawling in Northern British Columbia's Chatham Sound produced shrimp in possible commercial quantities. Trawling in other areas either resulted in negative results or quantities caught were not of commercial size. Prawn trapping yielded possible commercial quantities in two localities in Georgia Strait and Juan de Fuca Strait. Results with prawn traps were not promising along the northern British Columbia coast and only a small portion of the suitable ground was explored off the west coast of Vancouver Island. Detailed drawings of prawn trap construction and complete log and maps of all fishing activity are included.

--J. L. Squire, Jr.

A Study of the Maryland Tidewater Sport Fishery, by R. D. Buzzell and E. T. Walker, Resource Study Report No. 4, 19 pp., illus printed Maryland Department of Research and Education, Solomons Island, Md.

Studies on Ecdysis in the American Lobster (HOMARUS AMERICANUS) 4. Estrogenic Hormone as a Possible Moult-Inhibitor in the Egg-Bearing Female, by J. Kenneth Donahue, Research Bulletin No. 24, 6 pp., printed. Department of Sea and Shore Fisheries, Vickery-Hill Building, Augusta, Maine, August, 1955.

"Study Reveals More Facts on Commercial Fishing," by William R. Dryer, article, The Tennessee Conservationist, vol. XXI, no. 8, August 1955, p. 1, illus., printed. Tennessee Department of Conservation and the Tennessee Game and Fish Commission, Editorial Office, 233 Cordell Hull Bldg., Nashville, Tenn. This study of commercial fishing activities in Tennessee waters was undertaken by the State Game and Fish Commission to iron out difficulties arising between commercial fishermen, sport fishermen, and fish dealers. The study brings out some interesting facts of value to state regulatory agencies faced with the continual conflict between commercial and sports fishermen. The commercial fisheries of Tennessee are estimated to be worth $2.5 million annually and include 2 million pounds of catfish for the year ending June 30, 1954. Complaints of the parties involved are considered, with some suggestions as to ways and means of resolving these conflicts.

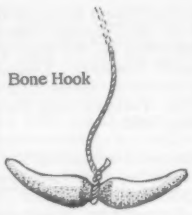
The UNESCO Courier, vol. VIII, no. 3, August 1955, 36 pp., illus., printed, 25 cents per copy. United Nations Educational Scientific and Cultural Organization, Publications Service, 475 Fifth Ave., New York 17, N. Y. Describes the international and national efforts to exploit new marine resources and the latest developments in oceanographic research. Other articles tell about "Hunting the Whale," "Migrating Mammoths," "Bread from the Sea," "Strange Facts about Neptune's Realm," and "Fish in Myth and Legend."

Watch for the Green Crab--A New Clam Enemy, by J. C. Medcof and L. M. Dickie, General Series Circular No. 26, 1 p., illus., printed. Fisheries Research Board of Canada, Atlantic Biological Station, St. Andrews, N. B., July 1955.

World Population and World Food Supplies, by Edward John Russell, 516 pp., illus., printed. George Allen & Unwin Ltd., Ruskin House Museum Street, London, England. Among the subjects discussed are fish consumption and fish culture.

ICE FISHING IN MICHIGAN

The Indians were the fellows who started this business of ice fishing in Michigan, long before Columbus, long before the time of steel hooks. They used spears, bows and arrows, and a kind of stone or bone hook called a gorge. Bait was placed on the gorge and the fish was allowed to swallow it. When the line was pulled, the gorge turned sideways inside the fish and served as a fairly efficient anchor inside the fish's gullet.



The tip-up became popular with Indians on Keweenaw Bay more than 100 years ago, the first ones being made of bent twigs. About this time too, the redman was hauling lake trout to the shores of the Straits of Mackinac in a dog sled and this still was long before the white man thought of the practicality or enjoyment of this sport.

As we know it today, ice fishing had its beginning in the early thirties, near Coldwater in Branch County. Here a few hardy individuals discovered they could catch bluegills through the ice. This was the start, and caused the growth of ice fishing to its present place of popularity. In two decades it has become a major factor in Michigan's conservation and tourist work.

For every fisherman who 20 years ago enjoyed catching bluegills through the ice, there are now several thousand waiting for the big freeze each fall to pursue their favorite cold-weather pastime. Their windbreaks, tip-ups, and shanties are found everywhere on Michigan waters in the winter. They are out for bluegills, perch, smelt, northern pike, walleyes, lake trout, crappies, whitefish, sturgeon, and a variety of pan fish, with women constituting a high percentage of the total number of anglers.

--Michigan Conservation,
January-February 1955.

WHAT ARE MINNOWS?

Any small fish may be loosely designated as a "minnow" or "minnie." The word minnow undoubtedly is derived from the Latin "minutus," meaning small. A better general term for the young of fish is "fry." Actually, "minnows" should be properly applied only to the family Cyprinidae, which includes the carp and goldfish, as well as the true minnows. Oddly enough, this minnow family includes a species which grows to a length of 5 feet and a weight of 80 pounds. This is the "white salmon" of the Colorado River Basin, Ptychocheilus lucius. Another group of fish is the "top minnow," which includes the famous Gambusia, planted widely to combat mosquitoes. Gambusia, or mosquitofish as it is more commonly called, feeds on the larvae of mosquitoes and in this way keeps down the numbers of these pests.

--Sea Secrets, June 6, 1954,
University of Miami Marine Laboratory,
Coral Gables, Fla.

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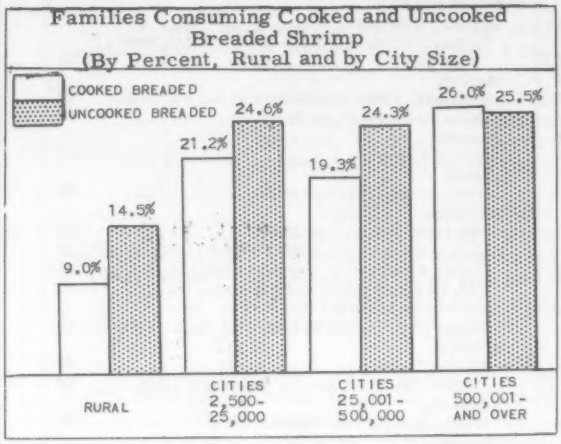
BREADED FISHERY PRODUCTS CONSUMER PREFERENCES BY POPULATION AREAS

The second in a series of reports resulting from a nationwide survey of household consumer preferences for breaded shrimp and breaded fish sticks was recently released by the U. S. Fish and Wildlife Service. Fishery Leaflet 425 (Household Consumer Preferences for Breaded Shrimp & Breaded Fish Sticks. Part 2 - Summary by Farm and Nonfarm Rural and City-Size Groups) summarizes the information obtained from the survey with respondents classified (a) by farm and nonfarm groups and (b) by rural groups and by various-size city groups.



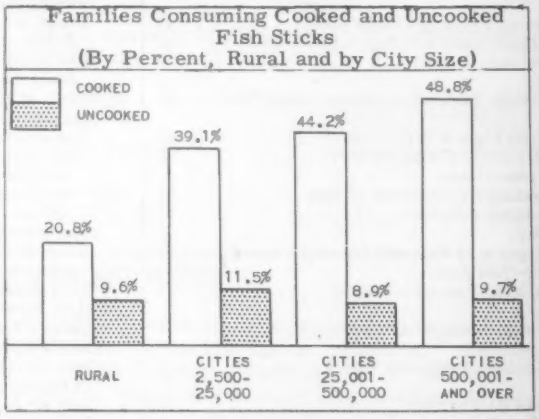
The survey, made by a commercial research firm in 1954 under the direction of the Fish and Wildlife Service, represents tabulated results of a mailed questionnaire to 1,797 selected respondents, predominantly housewives, so chosen as to be representative of all households in the United States.

A summary of the data in this publication produces these facts:

1. The predominant marketing problem for breaded shrimp is to get homemakers to try them--9 out of 10 homemakers trying breaded shrimp become satisfied customers.

2. Breaded shrimp consumption is concentrated in urban areas. Consumption in the cities is about twice as high as in rural areas.

3. The spectacular rise in fish-stick sales is an urban consumption phenomenon. Among urban housewives about 40 percent use fish sticks as against 13 percent for farm housewives.



4. Fish-stick consumption increases in relation to population density. About 39 percent of the homemakers in smaller towns use cooked fish sticks, 44 percent in cities from 25,000 to 500,000 population, and 49 percent in the largest cities.

5. The acceptance rate among housewives for fish sticks is very high for both rural and urban markets. Something like 85 percent of all homemakers buying fish sticks are satisfied with them.

6. Neither breaded shrimp nor fish sticks replace completely other fishery products. Only a minority of the respondents indicated even partial substitution of breaded shrimp or fish sticks for other fishery products.

Fishery Leaflet 424 (Household Consumer Preferences for Breaded Shrimp & Breaded Fish Sticks. Part 1 - National and Regional Summary) was the first of the series which presented an analysis of the replies on a national and regional basis. Fishery Leaflet 426, which will be issued in the near future, will present an analysis of the replies with respondents classified as to the age of the homemaker, the size of the family, the occupation of the head of the household, and by family income.